



Snoring - Harmful Effects

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INTRODUCTION

Sleep is essential for life. It recharges the mind and the body. It is estimated that 1 in 7 Americans have a chronic sleep / wake disorder.¹ In India 1/3rd of the population goes to sleep wherever they are standing when it is time to sleep.¹ It can be observed that subjects can sleep on pavements, road dividers, in railway trains and even when they are standing. Sleep deprivation is common in cities where fast paced life eats into the time spent in sleeping. Sleep disorders can also result in sleep deprivation. Sleep disorders are being increasingly recognized in clinical practice as they can result in organic disorders. For example, obstructive sleep apnoea is a risk factor for cardiovascular disorders.

Snoring is common in society. Snoring is observed easily when a group of people sleep together, for e.g. in sleeper coaches of trains. As a rough estimate there are at least 3 snorers in each sleeper coach of train disturbing the fellow passengers. It is the sleeping partner or a subject sharing the bedroom brings the habit to the notice of the doctor. It is also assumed by large number of people that snoring is sign of sound sleep. A snorer is often isolated during sleeping hours in family so that he does not disturb others. In the Western countries snoring has been a reason cited for divorce. It is therefore a sociomedical problem.

EPIDEMIOLOGY

Snoring affects 20 percent of the adult population and as much as 60 percent of men above 40 years of age. Snoring can be classified into a) Simple b) Symptomatic. Symptomatic refers to snoring associated with daytime lethargy and excessive daytime sleepiness.

Snorers can also be divided into occasional snorers and habitual snorers (who snore always every night). Lugaesi et al² have reported that 19% of an unselected population is habitual snorers. Men snore more (25%) than women (15%) and older subjects snore more than the young. Snoring often appears around 30 years and/ or when then the subject puts on weight. It may then progress over the course of years and ultimately develop into a full blown obstructive sleep apnoea / hypopnoea. syndrome (OSAHS). Snoring to OSAHS is therefore a spectrum. Snoring is a preapneic marker of OSAHS.

Awareness of sleep apnoea / hypopnoea syndrome which affects about 2% of the population is increasing among both doctors and public.³ In India, Udawadia et al⁴ have reported the prevalence of sleep disordered breathing as 19.5% while that of OSAHS to be

7.5%. This high prevalence has an impact in the development of several disorders and could therefore pose major public health problem in India.

In children snoring is usually due to enlarged tonsils and adenoids. OSAHS in children can cause learning disabilities.

WHAT IS SNORING?

Snoring can be defined as an inspiratory noise produced by the vibration of the soft parts of the oropharyngeal walls.

Is snoring harmful?

Habitual snoring is harmful for the following reasons:

- i. It heralds the development of OSAHS. Snoring which may be mild and simple may progress over the course of years.
- ii. Owing to obstructed breathing there may be episodes of oxygen desaturation in sleep which is harmful.
- iii. Snoring often results in restless sleep.

Snoring sounds are not welcome in society.

Therefore snoring should be evaluated and treated.

PATHOPHYSIOLOGY

Certain changes occur in sleep, which have an important bearing in the development of sleep-disordered breathing. During sleep the functional residual capacity and the lung compliance normally decrease. Also there is increase in the intrathoracic airway and upper airway resistance and this further increases in rapid eye movement (REM) sleep and in obese subjects. The pharyngeal dilators and increase in lung volume are the opposing forces which keep the airway open in sleep. Partial collapse of the airway results in obstructed breathing and snoring. Complete collapse results in apnoea. The negative endo-thoracic pressure creates a suction mechanism which triggers the downward traction of the laryngo-tracheobronchial tree resulting in narrowing of oropharyngeal isthmus.

The collapsing forces which promote pharyngeal collapse are:

- a. negative pressure within the airway (during inspiration)
- b. positive pressure outside the airway (fat deposition, small mandible)

The dilating forces promoting pharyngeal patency are

- a. Activation of pharyngeal dilator muscle – genioglossus
- b. Increase in lung volume (keep airway open by longitudinal traction)

SNORING AND STAGES OF SLEEP

Snoring may appear as soon as the patient falls asleep (Stage I NREM). It then gradually increases, reaches a peak in stage 4. In REM sleep contrary to expectations snoring diminishes due to loss in tone in tensor veli palatini which is responsible for the oscillations. However, in patients of OSAHS due to arousals and destruction of sleep architecture snoring continues throughout the period of sleep. Obviously snoring stops when there are apnoeas.

FACTORS INFLUENCING SNORING

There are several factors, which have a bearing in the development and progression of snoring.

Anatomical factors

Narrowing of upper airway can result in snoring due to increase in upper airway resistance and consequent rise in endothoracic pressure to ensure normal tidal volume. The pharyngeal walls collapse leading to pharyngeal closure partial or complete. The causes of narrowed upper airway are:

- a. Congenital narrowing of nasal and or pharyngeal cavity.
- b. Deviated nasal septum.
- c. Hypertrophy of turbinates.
- d. Hypertrophy of adenoids and tonsils.
- e. Congenital or acquired micrognathia
- f. Congenital or acquired retrognathia
- g. Inferior position of hyoid bone.
- h. Macroglossia.
- i. Obesity (mass effect or neck load.) Fat crushes the upper airway
- j. Local deposition of fat in the pharynx and submental region.

The osteogenic etiology of OSAHS in Asia has been strongly proposed by various workers.^{5,6} Udawadia et al⁴ in his study observed that 27% of the subjects with SDB had a BMI of less than 27, which is the cut-off point for obesity in Asians. In our study series of 48 patients who underwent polysomnography had a BMI of less than 27 indicating that obesity is not the only risk factor of SDB / OSAHS in India and craniofacial features play a major role in the development of the disorder.

Sex

Snoring is more prevalent in men as compared to women. Progesterone may possibly have an influence since snoring increases at menopause and use of medroxyprogesterone has sometimes found to be useful. There is also a smaller airway and greater airway resistance in men as compared to women.⁷

Sleep Deprivation

Modern lifestyle, fast-paced life, has rewarded many subjects with sleep deprivation. Even children suffer from sleep deprivation due to coaching classes and tremendous educational stress. Sleep deprivation induces or aggravates snoring by increasing muscular hypotonia and delaying contraction of dilator muscles of the pharynx.⁸

Posture

Supine position while sleeping which is the ideal posture can result in tongue fall (gravitational effect) more so in subjects having macroglossia resulting in partial or complete airway closure. As per ancient Indian healing practices, the various body chakras (energy receiving centers) are in alignment when the subjects sleep supine. This facilitates smooth flow of energy in body systems and thereby initiates good health in all levels of existence.⁹

Endocrine factors

Hypothyroidism and acromegaly are two disorders where snoring is common. In the former myxedematous changes and altered muscular contractility play their part while macroglossia, thickening of pharyngeal mucosa and facial cartilaginous or bone changes contribute to the development of snoring in the latter.

Drugs

Alcohol a) induces peripheral vasodilatation and consequent swelling of pharyngeal mucosa, b) depresses respiratory centre, c) causes hypotonia of pharyngeal dilators. All these aggravate or precipitate snoring. Similarly hypnotics and sedatives – aggravate snoring by depressing ventilatory drive and by inducing muscular hypotonia.

Smoking

Smoking may induce snoring by raising upper airway resistance after changes in mucociliary clearance and therefore is a risk factor for snoring.

EFFECTS OF SNORING

a) Alveolar ventilation decreases more in snorers than in non-snorers. b) Pulmonary arterial pressure increases during snoring and it can rise above the upper limit. c) Systemic arterial pressure increases due to increased negative endothoracic pressure and also due to hypoxic events in sleep which cause sympathetic stimulation. d) In patients who suffer from associated lung disease like obstructive lung disease (overlap syndrome) snoring impairs ventilation raising nocturnal hypoxemia.

Snoring as risk factor

There are studies to show that snoring is a risk factor for hypertension^{10,11} ischemic heart disease^{12,13} and brain infarction.^{14,15} In patients with OSAHS and snorers the blood pressure is higher and it oscillates. The elevated catecholamines in the night may remain elevated throughout the day. Hla et al¹⁶ have reported that more than half of patients with obstructive sleep apnoea have systemic hypertension compared with an expected prevalence of 20% in middle-aged obese men. Also approximately, 25% of patients with hypertension have obstructive sleep apnoea.¹⁷⁻¹⁹ OSAHS is linked to diabetes.²⁰

Snoring and OSAHS

Snoring as symptom is a reflection to a spectrum of disorder from simple snoring to full blown OSAHS. What begins as a simple snoring may progress over the course of years to OSAHS. Snoring per se is not taken seriously in society and is often considered as a sign of sound sleep. Even patients OSAHS may be missed in

clinical practice if sleep habits are not enquired in routine clinical history. It is rare to find snoring progressing to OSAHS after the age of 65 years.

Stages of Snoring

There are four stages of evolution process from snoring to OSAHS.²

Stage	Characters
Stage 0 or preclinical	Heavy snoring alone
Stage 1	Daytime somnolence. Snoring Intermittent during long stretches of sleep.
Stage 2 Overt disease	Daytime sleepiness and intermittent snoring throughout night.
Stage 3 Complicated	Presence of cardiorespiratory complications associated with obstructive or restrictive pulmonary impairment.

What are the symptoms of OSAHS?

Any subject having the following symptoms or complaints must be suspected to suffer from OSAHS.

- i. Habitual snoring.
- ii. Day-time sleepiness.
- iii. Lack of energy, fatigue, exhaustion.
- iv. Irritable behaviour.
- v. Episodes of loss of memory.
- vi. Vehicular accidents or near-miss accidents due to sleepiness while driving.
- vii. Hypertension.
- viii. Nocturia
- ix. Decreased efficiency at work place resulting in loss or promotions or loss of job.
- x. Increase in body weight possibly due to inactivity and sleepiness.
- xi. OSAHS can coexist with lung diseases like asthma, bronchitis and desired improvement may not be obtained by treating them alone.
- xii. Impotence.

What are the effects of OSAHS on the body systems?

OSAHS can lead to:

1. Hypertension
2. Ischemic heart disease
3. Strokes
4. Diabetes
5. Vehicular accidents
6. Dementia
7. Increase in body weight
8. Impotence
9. Sudden death in sleep has also been reported

OSAHS should also be suspected in cases of (i) refractory hypertension and (ii) refractory heart failure.

CLINICAL APPROACH

All patients must be examined and evaluated. Since a snorer is unaware of his snoring habit history taking must involve the spouse or partner sharing the bedroom. Detailed history must involve:

- a. Duration and intensity of snoring
- b. Gasping or choking for breath.
- c. Involuntary movements or jerking of limbs in sleep
- d. Nocturia
- e. Day-time drowsiness in soporific situations.

Clinical examination must be complete and it is important to record BMI, waist-hip ratio, blood pressure measurement, ear, nose throat examination and neck circumference. A polysomnogram will be required to assess the stage of snoring and plan further management.

Polysomnography is preferably done in hospital since monitoring and recording may not be possible in congested, noisy rooms. Moreover, sleep technicians may not be welcome in patient's house. In shift workers also, the study is done at night.

MANAGEMENT²¹:

Conservative Measures:

For those who snore in supine position and have the polysomnogram normal, snoring can be reduced or eliminated by sleeping on one side. To this effect a tennis ball may be sewn at the back of pyjamas.

Achievement of ideal body weight and treatment of conditions like hypothyroidism acromegaly are beneficial. However it must be noted that increasing metabolism by administering thyroxin the cardiac rate may increase against a background of hypoxemia resulting in cardiac arrhythmias in sleep. Therefore, help of continuous positive airway pressure is necessary along with thyroxin replacement therapy. Alcohol, sedatives, and hypnotics are best avoided. In fact drugs have no role to play.

In children, adenotonsillary hypertrophy is amenable to surgical treatment. A postoperative polysomnography will be helpful in assessing the efficiency of surgery.

Surgical

Anatomical defects must be detected and treated surgically. Operation on minor disorders like septal deviation or nasal polyps is often unrewarding. In general if the level of obstruction can be detected precisely it guides the physician to plan the proper mode of therapy. Patients who are CPAP failures are subjected to surgery. In patients where no physiological impairment causing snoring can be identified and for those help is being sought purely for a social problem it might be helpful to consider uvulopalato pharyngoplasty(UVPP).²² It is important to assess the patient preoperatively whether he will benefit from this procedure. The tests include tomography of upper airways, cephalometry, direct visualization of pharynx and Muller's manœuvre.

The other surgical procedures are hyoid bone reconstruction, maxillo-facial surgery for retrognathia or micrognathia. Dentists

may help some patients by tongue retaining devices and other dental devices.

Continuous positive airway pressure (CPAP)

Is treatment of choice for patients of stage 1,2 or 3 OSAHS. The results are dramatic and the patient often reports with a sense of well being, alertness on the very next day of using CPAP. He also appreciates the good restful sleep which was denied by the disorder. Overall the compliance to CPAP is excellent. It is to be noted that patients who have failed to respond to UVPP, then CPAP may not be effective as the pressure applied through the nose may leak out through the mouth due to destruction of the seal between soft palate and tongue.

Snoring though commonly observed in society should not be ignored. Every snorer must be examined and evaluated. The serious consequences of OSAHS cannot be overemphasized. It should also be noted that every snorer is not a subject of OSAHS and awareness of these disorders is important in the society and amongst medical professionals.

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