

Study of Etiology and Management of Snoring at a Tertiary Care Teaching Hospital

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ABSTRACT

Background and Objectives: Snoring is a common condition affecting approx 30 to 50% of adult population. Present study was conducted to detect the obstruction in the upper airway of patients suffering from snoring, locate the site of obstruction, evaluate the validity of methods available, clinically find out the difference between snorer without apnea and snorer with apnea, and evaluate various surgical & non-surgical methods available for correction of obstruction.

Materials & Methods: Present prospective study was conducted in the department of Otorhinolaryngology and head and neck surgery, PBM Hospital and SP Medical College, Bikaner. 50 Patients with complaints of snoring attending outpatient department of Otorhinolaryngology was selected.

Detailed sleep history of the patient and the partner; snoring, restlessness at night; excessive day time sleepiness, deterioration of intellectual capacity, personality changes, morning headaches, blood pressure, addiction, resent increase in weight, family history was taken. Complete physical and Otolaryngological examination was carried out. Systemic examination to rule out contributing factors or complications of the diseases.

Results: In our study, snoring was noted both in children (mean age 7.3 years) and adults commonly the middle aged population (mean age 40 years). The ratio of male to female in our study was 3.8:1. Snoring in patients was reported to be continuous or interrupted with gasping, loud which can be heard outside the room and present in all the positions of the patient. In adults, specific symptoms suggestive of OSA noted were breathing pauses (40%), restless sleep (28.57%), nocturnal choking (11.43%). Less specific symptoms reported were: dry mouth (40%), morning headache (45.71%), drooling (22.86%), nocturia (14.29%) etc. In children mouth breathing (100%), restless sleep (80%), breathing pauses (60%), nocturnal choking (40%) were noted.

INTRODUCTION

Simple snoring is defined as snoring without obstructive apneas, frequent arousals or gas exchange abnormalities. It is generally considered benign; however, there is growing evidence in children, but not in adults, that it is not as innocuous as is usually believe. Simple snoring is part of the spectrum of sleep disordered breathing (SDB) ranging from intermittent snoring, through obstructive sleep apnea syndrome (OSAS), to obesity hypoventilation syndrome.¹

Children also problems in swallowing (40%), recurrent URTI (66.67%), persistent nasal discharge (40%), behavioural changes (13.33%) poor attention span (26.67%).

Clinical examination in children revealed adenotonsillar enlargement (53.33%) adenoid enlargement (20%) tonsillar enlargement (20%) as commoner causes. Down's syndrome with adenoid hypertrophy was other causes of snoring in children (6.67%).

Conclusion: All patients who present with significant snoring should be properly evaluated and managed suitably at the earliest to prevent potentially serious complications. The site of upper airway obstruction in adults was at multiple levels and involves both soft tissue and skeletal structure. In children it is adenoids and/or tonsils, and facial dysmorphism in some cases. Meticulous clinical and upper airway endoscopic examination along with radiological examination is required to detect the above. Multiple modes of treatment suiting individual needs are available.


Key Words: Obesity, Obstructive sleep apnea syndrome, Snoring.

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Snoring and obstructive sleep apnea syndromes are the two commonest respiratory sleep disturbances which have gained importance in the recent years.

Charles Dickens is credited with the classic description of a typical OSAS patient in his Pickwick Papers in 1837, not much was known about the disorder until Guilleminault and colleagues described the syndrome more accurately in the 1970s.² This led to a further understanding of the serious health problems associated

with the disorder and currently an increased general awareness exists in our country too currently.

Snoring is a common condition affecting approx 30 to 50% of adult population. Previously considered only to be a habitual annoyance it has been now identified to have significant physical and social consequences.

Snoring may antedate the development of obstructive events. However majority of such people do not develop OSA or have any long term health risks.

Aggravating factors may include alcohol consumption, active and passive smoking, gastroesophageal reflux, obesity, male gender and increasing age.³⁻⁶

Snoring, like all other sounds, is caused by vibrations that cause particles in the air to form sound waves. For example, when we speak, our vocal cords vibrate to form our voice. When our stomach growls (borborygmus), our stomach and intestines vibrate as air and food move through them. While we are asleep, turbulent airflow can cause the tissues of the nose and throat to vibrate and give rise to snoring. Essentially, snoring is a sound resulting from turbulent airflow that causes tissues to vibrate during sleep.

Any person can snore. Studies estimate that 45% of men and 30% of women snore on a regular basis. Frequently, people who do not regularly snore will report snoring after a viral illness, after drinking alcohol, or when taking some medications.

People who snore can have any body type. We frequently think of a large man with a thick neck as a snorer. However, a thin woman with a small neck can snore just as loudly. In general, as people get older and as they gain weight, snoring will worsen.

When we are asleep, the area at the back of the throat sometimes narrows. The same amount of air passing through this smaller opening can cause the tissues surrounding the opening to vibrate, which in turn can cause the sounds of snoring. Different people who snore have different reasons for the narrowing. The narrowing can be in the nose, mouth, or pharynx.

Snoring is a less severe form of airway dysfunction which leads to impaired sleep quantity and quality resulting in excessive daytime sleepiness (EDS). Airway dysfunction results from anatomical narrowing as well as abnormal neuromuscular control in these patients. Common abnormalities leading to airway narrowing include: deviated nasal septum (DNS), inferior turbinate hypertrophy (ITH), nasal polyp/mass, nasopharyngeal mass or tumor, lingual tonsillar hypertrophy, vallecular cyst, redundant aryepiglottic folds, soft palate/uvula elongation, adenotonsillar hypertrophy, macroglossia, retrognathia, and micrognathia.^{7,8}

Obesity has been identified as the major risk factor in adults for development of obstructive breathing.⁶ The patients chiefly presents with the complaint of snoring and excessive daytime sleepiness (EDS).

Meticulous general examination, otorhinolaryngological examination as well as systemic examination is necessary. The examination findings combined with fiber optic endoscopy and cephalometric analysis (radiography of head and neck) are coordinated to assess the level of obstruction.

Obesity is one of the major risk factors for snoring & OSAS, weight loss should be encouraged in all obese patients. A complete life-style change is needed as it is often difficult for patients to maintain the weight loss over time. There are other forms of treatment of the upper airway abnormality beside the

weight loss. The use of appliances like the nasal filters, dental guards and other mandibular or tongue devices are important tools.⁹

Continuous positive pressure (CPAP) therapy is the only alternative effective non-surgical method to treat such patients, who fail to qualify for surgery and want an alternate therapy but it is only applicable to OSAS patients not for simple snoring patients.¹⁰

Surgical management includes volumetric reduction of the soft tissues of the upper airway by surgical techniques like the surgery of the tonsils, adenoids, palate, lateral pharyngeal wall, tongue, hyoid and the bony skeleton of the face like the mandible and the maxilla, nasal septum hypertrophied turbinate, nasal polyp or mass and nasopharyngeal mass or tumor.¹¹

With this background present study was conducted to detect the obstruction in the upper airway of patients suffering from snoring, locate the site of obstruction, evaluate the validity of methods available, clinically find out the difference between snorer without apnea and snorer with apnea, and evaluate various surgical & non-surgical methods available for correction of obstruction.

MATERIALS AND METHODS

Present prospective study was conducted in the department of Otorhinolaryngology and head and neck surgery, PBM Hospital and SP Medical College, Bikaner between Dec 2009 to Nov 2010. 50 Patients with complaints of snoring attending outpatient department of Otorhinolaryngology was selected.

Detailed sleep history of the patient and the partner; snoring, restlessness at night; excessive day time sleepiness, deterioration of intellectual capacity, personality changes, morning headaches, blood pressure, addiction, resent increase in weight, family history was taken. Complete physical examination was carried out including general survey (weight, height, BMI, BP etc), face and neck examination (facial contour, mouth breathing, neck length, neck circumference, occlusion pattern). Otolaryngological examination (detailed examination of nose, oral cavity, oropharynx, larynx, hypopharynx), endoscopic examination of larynx and pharynx. Systemic examination to rule out contributing factors or complications of the diseases. Routine laboratory investigations like hemoglobin, bleeding time and clotting time, TLC, DLC, ESR, urine examination (routine and microscopic examination), thyroid hormone profile, lipid profile, Blood sugar levels, ECG, Cephalometric analysis was done.

Radiological examinations like X-Ray Paranasal sinuses, X-Ray Soft tissue neck lateral view, X-Ray nasopharynx lateral view in open mouth position, Chest X-Ray PA View, CT Scan were carried out on case to case basis as required.

The treatment was tailor-made for the individual patient. Patients were followed up at frequent intervals for clinical and Subjective improvement of symptoms. The first follow up following the postoperative period for assessment of relief in case of use of surgical intervention was at 4 weeks.

Repeat cephalometric analysis was done in all cases. Appropriate specific investigations as per individual case requirement were performed.

RESULTS AND DISCUSSION

In our study, snoring was noted both in children (mean age 7.3 years) and adults commonly the middle aged population (mean

age 40 years). Children with mild dysmorphism present with snoring during the peak enlargement period of tonsils and adenoids i.e. between 6-8 years.^{12,13} Young et al. estimated the maximum number of snorers is in middle aged working population.¹⁴

Young et al (1993)¹⁴ and Chaudhary et al (1982)¹⁵ have shown that preponderance of snoring was in the male population. The ratio of male to female in our study was 3.8:1. Shyness and the inability to complain about snoring being foremost. Further lack of knowledge and exposure to information could be another reason, especially in a country like India. Most of the women in India work at home only and visit a doctor only if the conditions are extreme. Snoring in patients was reported to be continuous or interrupted with gasping, loud which can be heard outside the room and present in all the positions of the patient. In adults, specific symptoms suggestive of OSA noted were breathing pauses (40%), restless sleep (28.57%), nocturnal choking (11.43%). Less specific symptoms reported were: dry mouth (40%), morning headache (45.71%), drooling (22.86%), nocturia (14.29%) etc.

In children mouth breathing (100%), restless sleep (80%), breathing pauses (60%), nocturnal choking (40%) were noted. Children also problems in swallowing (40%), recurrent URTI (66.67%), persistent nasal discharge (40%), behavioural changes (13.33%) poor attention span (26.67%). Clinical examination in children revealed adenotonsillar enlargement (53.33%) adenoid enlargement (20%) tonsillar enlargement (20%) as commoner causes. Down's syndrome with adenoid hypertrophy was other causes of snoring in children (6.67%).

In adults, disproportionate upper airway anatomy at multiple levels was the most important cause of upper airway obstruction in patients of snoring. The features of disproportionate anatomy noted in our patient include: low-lying, long, thick soft palate (48.57%), oedematous uvula which may be long (37.14%) or of normal length (28.57%), webbing of pillars with less than 20mm inter pillar distance (37.14%), webbing of pillars (40%) tongue was also large in patients with snoring (grade III- 40%). Grade III lateral pharyngeal bands were more commonly noted in patients with severe snoring (22.86%).

Table 1: Age Distribution in children (n=15)

Age Range(yrs)	Number of Patients	Percentage (%)
0-5	1	6.67
6-10	11	73.33
11-15	3	20.00

Table 2: Age Distribution in adults (n=35)

Age Range(yrs)	Number of Patients	Percentage (%)
11-20	4	11.43
21-30	2	5.71
31-40	8	22.86
41-50	13	37.14
51-60	6	17.14
61-70	2	5.71

Table 3: Symptomatology in Adult patients (n =35)

Symptoms	No. of cases	Percentage (%)
Snoring	35	100.00
Excessive daytime sleepiness	21	60.00
Sleep Disturbances		
Breathing pauses	14	40.00
Restless sleep	10	28.57
Nocturia	5	14.29
Nocturnal choking	4	11.43
Associated symptoms		
Morning headache	16	45.71
Dry mouth	14	40.00
Unrefreshing sleep	14	40.00
Poor concentration	10	28.57
Decreased attention	8	22.86
Drooling	8	22.86
Depression	2	5.71
Personality change	2	5.71
Nasal Symptoms		
Nasal Obstruction	8	22.86
Throat Symptoms		
Lump Sensation in Throat	1	2.86

Table 4: Symptomatology in Paediatric Patients (n=15)

Symptoms	No. of cases	Percentage (%)
Snoring	15	100.00
Mouth-breathing	15	100.00
Restless Sleep	12	80.00
Frequent cold	10	66.67
Excessive sleepiness	9	60.00
Breathing pause	9	60.00
Nocturnal choking	6	40.00
Difficulty in swallowing	6	40.00
Nasal discharge	6	40.00
Mood swings	5	33.33
Poor attention	4	26.67
Enuresis	2	13.33
Aggressive/hyperactive behaviour	2	13.33

Table 5: Upper airway examination in Children (n =15)

CAUSE	No. of Patients	Percentage (%)
Adenotonsillar enlargement	8	53.33
Adenoid enlargement only	3	20.00
Tonsillar enlargement only	3	20.00
Craniofacial anomaly with adenoid hypertrophy	1	6.67

Table 6: Upper airway examination in adult patients (n =35)

	No. of Patients	Percentage (%)
A. NASAL CAVITY		
DNS	2	5.71
ITH	2	5.71
Nasal Polyp	4	11.43
Normal	27	77.14
B. NASOPHARYNX		
Adenoid	2	5.71
AC Polyp	1	2.86
Normal	32	91.43
C. PALATE		
Long & Thick	17	48.57
Long	7	20.00
Normal	11	31.43
D. TONGUE		
Grade I	1	2.86
Grade II	20	57.14
Grade III	14	40.00
E. UVULA		
Oedematous and Long	13	37.14
Oedematous	9	25.71
Long	3	8.57
Normal	10	28.57
F. TONSILS		
Grade I	11	31.43
Grade II	20	57.14
Grade III	4	11.43
G. PILLARS AND INTER PILLAR DISTANCE		
Webbing with reduced inter pillar distance	13	37.14
Webbing	14	40.00
Normal	8	22.86
H. LATERAL PHARYNGEAL BAND		
Grade I	11	31.43
Grade II	16	45.71
Grade III	8	22.86
I. HYPOPHARYNX		
Vallecular cyst	1	2.86
Normal	34	97.14

Among the morphometric indicators, nuchal obesity (74.29%) and generalized obesity (40%) were commonly noted in adults OSAS population. 34.29% were overweight. Kushida et al state that cut off level of 40 cm as having sensitivity of 61% and specificity of 93% for snoring regardless of the sex.¹⁶ Fisher et al.(1981) postulated that obesity is the primary etiological factor in snoring.¹⁷ On the other hand, children with snoring were not obese.

Three (8.57%) patients were found hypothyroid whereas others had normal thyroid hormone profile. Skaturd JB et al, 1981 and other have observed that thyroid replacement cause significant reversal of snoring independent of weight change and pulmonary function.¹⁸ Four (11.43%) patients showed raised Lipid profile.

Three (8.57%) patients were found hypothyroid whereas others had normal thyroid hormone profile. Four (11.43%) patients showed raised Lipid profile.

In children surgical treatment were used. In most cases, adenotonsillar enlargement is the cause of obstruction. Studies have detected marked improvement in quality of life of children before and after adenotonsillectomy.^{19,20}

The behavioral and emotional difficulties in children with sleep disordered breathing also improve after surgery.²¹

Growth hormone secretion is impaired in children with snoring.²² After adenotonsillectomy, children with snoring normalize their growth hormone secretion and gain weight.²³

Table 7: Morphometric distribution in Adults (n=35)

Nuchal Obesity	No. of patients
> 40 cm	26 (74.29%)
< 40 cm	9 (25.71%)

Table 8: Morphometric distribution in Children (n=15)

BMI in Children	No. of patients
Underweight (<18.5)	2 (13%)
Healthy weight (18.5-24.9)	12 (80%)
Over weight (25-29.9)	1 (7%)
Obesity class I (30-34.9)	---
Obesity class II (35-39.9)	---
Obesity class III (>40)	---

Table 9: Morphometric distribution in adults (n=35)

BMI in Children	No. of patients
Underweight (<18.5)	---
Healthy weight (18.5-24.9)	9 (25.71%)
Over weight (25-29.9)	12 (34.29%)
Obesity class I (30-34.9)	13 (37.14%)
Obesity class II (35-39.9)	1 (2.86%)
Obesity class III (>40)	---

Table 10: Thyroid hormone profile and lipid profile

Profiles	No. of Patients (n=35)	Percentage (%)
Thyroid Hormone Profile		
Normal	32	91.43
Hypothyroid	3	8.57
Lipid Profile		
Normal	31	88.57
Raised	4	11.43

Table 11: Incidence of cardiovascular system involvement adult patients

	No. of Patients (n=35)	Percentage (%)
Normal	30	85.71
Hypertension	4	11.43
Arrhythmias	1	2.86

Table 12: Treatment given in children (n=15)

Treatment	No. of Patients (n=15)	Percentage (%)
Adenotonsillectomy	8	53.33
Adenoidectomy	4	26.67
Tonsillectomy	3	20

Multiple modes of treatment were used suiting individual needs e.g. Punctuate diathermy with weight reduction (28.57%), Conservative (20%). There have been studies were weight management has been found to effect the sleep pattern.²⁴ Surgery of the oropharyngeal tissues was first proposed by Ikematsu in 1964 for the treatment of habitual snoring. Fujita and colleagues subsequently adopted this technique for the treatment of snoring.²⁵

Tonsillectomy, Tonsillectomy with weight reduction, Thyroxine with weight reduction, Polypectomy with weight reduction and Septoplasty with P.D. (5.71%each). Adenoidectomy, Adenoidectomy with weight reduction with Punctuate diathermy, Polypectomy with weight reduction with Punctuate diathermy,

Polypectomy with Punctuate diathermy, Thyroxine with weight reduction with Punctuate diathermy, Turbinectomy, Turbinectomy with Punctuate diathermy, Vallecular cyst excision (2.86% each).

In adults, PD with or without other procedure was most commonly used (approx.50% of adults) owing to multiple levels of obstruction needing surgery at multiple levels and multiple sittings. Weight management guidelines were given to74.29% adults.

All the patients were evaluated at frequent intervals. The improvement was evaluated by questionnaire. 80% of our children showed marked improvement.13.33% children showed moderate improvement. 66% of adults showed marked and 34% showed moderate improvement. Response to treatment was most commonly and more easily achieved in children than adults.

Table 13: Treatment given in adult patients (n=35)

Treatment	No. of Patients	Percentage (%)
Punctuate diathermy with weight reduction	10	28.57
Conservative	7	20.00
Tonsillectomy	2	5.71
Tonsillectomy with weight reduction	2	5.71
Thyroxine with weight reduction	2	5.71
Polypectomy with weight reduction	2	5.71
Septoplasty with Punctuate diathermy	2	5.71
Adenoidectomy	1	2.86
Adenoidectomy with weight reduction with Punctuate diathermy	1	2.86
Polypectomy with weight reduction with Punctuate diathermy	1	2.86
Polypectomy with Punctuate diathermy	1	2.86
Thyroxine with weight reduction with Punctuate diathermy	1	2.86
Turbinectomy	1	2.86
Turbinectomy with Punctuate diathermy	1	2.86
Vallecular cyst excision	1	2.86

Table 14: Follow Up 3 months following treatment in children (n=15)

Improvement	No. of Patients	Percentage (%)
Markedly Improved	12	80.00
Partially Improved	2	13.33
Not Improved	1	6.67

Table 15: Follow Up 3 months following treatment in children (n=15)

Improvement	No. of Patients	Percentage (%)
Markedly Improved	12	80.00
Partially Improved	2	13.33
Not Improved	1	6.67

CONCLUSION

One of the biggest problems we faced during this study was the reluctance of the patients, especially in the adults group to give consent for surgery. All the patients were given option of treatment and the procedures were explained to each in detail. Reluctance to surgical option in adults was a grave problem, especially in the education lot. We feel after our study than even though the tongue and the soft palate may seem normal by examination, the small oral cavity due to bony change contributes to the obstruction. We observed somewhat similar picture in certain small children who

had a typical adenoid face, even though the size of the tonsils and the adenoids were not abnormal in measurements.

In conclusion it can be said that all patients who present with significant snoring should be properly evaluated and managed suitably at the earliest to prevent potentially serious complications. In conclusion the site of upper airway obstruction in adults was at multiple levels and involves both soft tissue and skeletal structure. In children it is adenoids and/or tonsils, and facial dysmorphism in some cases. Meticulous clinical and upper airway endoscopic examination along with radiological examination is required to

detect the above. Multiple modes of treatment suiting individual needs are available.

The obstruction and its severity and its potential to lead to snoring and OSAS are to be diagnosed and evaluated at the earliest to prevent development of fatal and potentially dangerous complications.

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