International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

Original Research Article.

Comparative Analysis of Snorers and Non-Snorers Using Cephalometric Analysis

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ABSTRACT

Background: The American Academy of Sleep Medicine (AASM) defines snoring as a sound originating from the upper airway (UA) that does not occur with apnoea or hypoventilation, and that is caused by vibrations of different tissues in the pharynx.

Aim of the study: To compare snorers and non-snorers using cephalometric analysis.

Materials and Methods: The study was conducted in the Department of Orthodontics, Vananchal Dental College & Hospital, Garhwa, Jharkhand, India. The ethical clearance for study protocol was obtained from ethical committee of the institution. For the study, we included patients with known history of regular snoring. A total of 50 patients with history of snoring were selected. 50 healthy subjects were selected as controls. For the analysis of hard tissues, lateral cephalogram was done for each patient.

Results: In the present study, 50 subjects with history of snoring and 50 controls were included. Standard lateral cephalogram was done for each patient. The findings were statistically non-significant.

Conclusion: From the results of present study, we observed non-significant difference between the pharyngeal dimensions of snorers and non-snorers.

Keywords: Snorers, Non-Snorers, Cephalometric Analysis, Pharyngeal Dimensions.

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Article History:
Received: 28-09-2018, **Revised:** 21-10-2018, **Accepted:** 22-11-2018

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2018.4.6.038	

INTRODUCTION

The American Academy of Sleep Medicine (AASM) defines snoring as a sound originating from the upper airway (UA) that does not occur with apnoea or hypoventilation, and that is caused by vibrations of different tissues in the pharynx.[1, 2] A person who snores for more than 10–20% of a monitored night, or more than 3 or 4 nights a week is classified as a habitual snorer. An association between snoring and obstructive sleep apnoea syndrome (OSAS) was first observed in 1975. OSAS is considered a progressive disorder that starts, often early in life, with habitual snoring. Based on different epidemiological studies performed between 1980 and 2007, the mean prevalence of snoring in the general population is approximately 32% in men and 21% in women; however, the prevalence of obstructive sleep apnoea (OSA) is 4% in men and 2% in women.[3, 4]

Several lines of evidence suggest that experimental reduction of nasal patency and flow has a significant effect on breathing during sleep. In one study, intranasal application of petroleum jelly gauzes in healthy volunteers-induced obstructive apnoeic episodes and resulted in significant increases in AHI, producing frank OSA in one subject. In another study, artificially induced complete or partial nasal obstruction resulted in significant alteration of sleep pattern, with increased micro arousals and total number of apnoeas. In a clinical setting, a number of studies have shown that the application of nasal packs during the management of epistaxis results in significantly worse quality of sleep with multiple apnoeas and desaturation episodes.[5, 6] Hence, the present study was conducted to compare snorers and non-snorers using cephalometric analysis.

MATERIALS AND METHODS

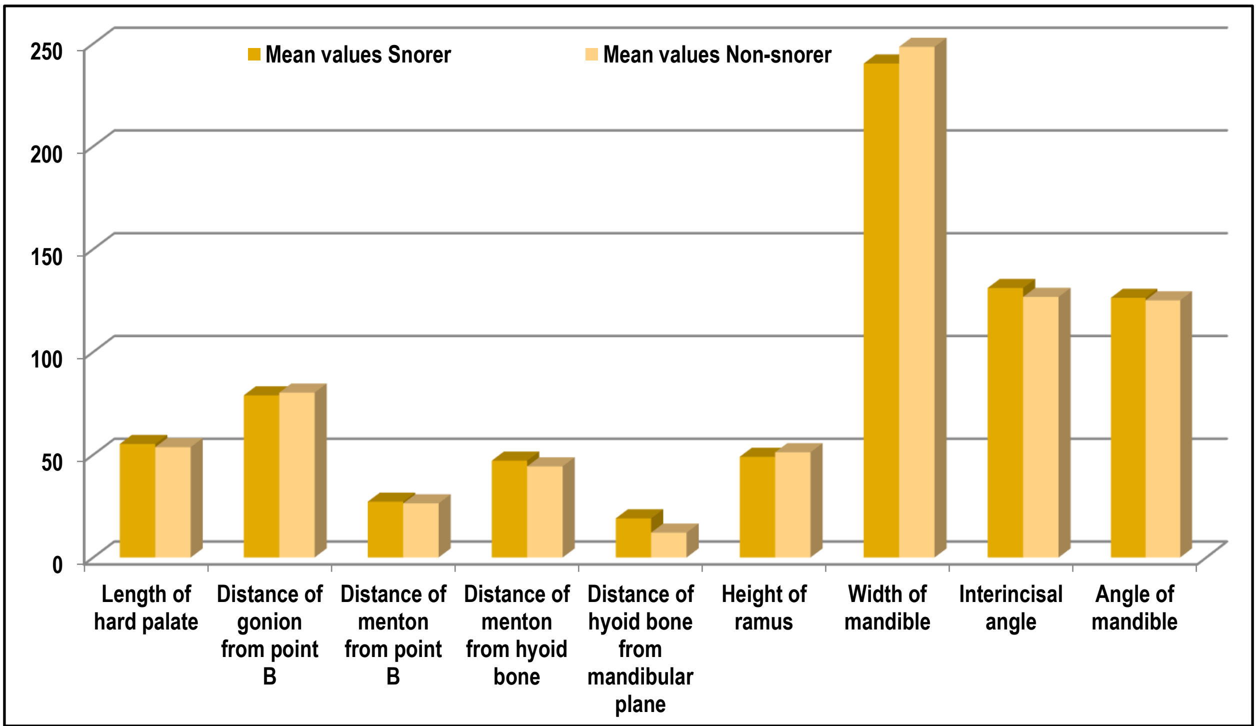
The study was conducted in the Department of Orthodontics, Vananchal Dental College & Hospital, Garhwa, Jharkhand, India. The ethical clearance for study protocol was obtained from ethical committee of the institution. For the study, we included patients with known history of regular snoring. An informed written consent was obtained from the participating subjects. Patient with history of craniofacial injury either hard tissue or soft tissue injury, history of orthodontic treatment, or with systemic diseases were excluded from the study. A total of 50 patients with history of snoring were selected. 50 healthy subjects were selected as controls. For the analysis of hard tissues, lateral cephalogram was done for each patient. All images were stored digitally and the image quality was optimized separately for soft tissue and hard tissue landmarks using the inbuilt software (DIGORA FOR WINDOWS). Hard tissue parameters evaluated on lateral cephalogram were length of hard palate, distance of gonion from Point B, distance of menton from Point B, distance of hyoid bone from mandibular plane, distance of hyoid bone from menton, height of ramus, interincisal angle and gonion angle. Width of mandible was analyzed on panoramic radiograph.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

Table 1: Comparison of hard tissue landmarks in both groups

Parameters	Mean values		p-value
	Snorer	Non-snorer	
Length of hard palate	55.23	53.66	0.22
Distance of gonion from point B	78.88	80.21	0.98
Distance of menton from point B	27.14	26.33	0.91
Distance of menton from hyoid bone	47.12	44.32	0.09
Distance of hyoid bone from mandibular plane	19.02	12.09	0.21
Height of ramus	48.98	51.21	0.21
Width of mandible	240.32	248.44	
Interincisal angle	131.12	126.77	0.87
Angle of mandible	126.32	125.11	0.11

Fig 1: Comparison of hard tissue landmarks



RESULTS

In the present study, 50 subjects with history of snoring and 50 controls were included. Standard lateral cephalogram was done for each patient. We evaluated that length of hard palate was 55.23 mm for snorers and 53.66 mm for non-snorers. Distance of gonion from point B was 78.88 mm for snorers and 80.21 mm for non-snorers. Distance of menton from point B was 27.14 mm for snorers and 26.33 mm for non-snorers. Distance of menton from hyoid bone was 47.12 mm for snorers and 44.32 mm for non-snorers. Distance of hyoid bone from mandibular plane was 19.02 mm for snorers and 12.09 mm for non-snorers. Height of ramus was 48.98 mm for snorers and 51.21 mm for non-snorers. Width of mandible was 240.32 mm for snorers and 248.44 mm for non-snorers. Interincisal angle was 131.12 mm for snorers and 126.77 mm for non-snorers. Angle of mandible was 126.32 mm for snorers and 125.11 mm for non-snorers. The findings were statistically non-significant.

DISCUSSION

In the present study, we compared snorers from non-snorers using cephalometric analysis of hard tissues. We observed non-significant difference between the measurement of various pharyngeal dimensions. Gungor AY et al compared the cephalometric characteristics of obstructive sleep apnea (OSA) patients with those of healthy subjects and determined possible relationships between cephalometric measurements of OSA patients and control subjects. Standardized lateral cephalograms of 16 OSA patients and 16 healthy controls were obtained. Airway dimensions and dentofacial parameters were measured using a cephalometric analysis program (Dolphin Imaging Cephalometric and Tracing Software, Chatsworth, CA, USA). Midface length was significantly shorter and upper lip E-plane length was significantly longer in the OSA group than in the controls. SNA, SNB, and mandibular plane angles (GoGn-SN), anterior and posterior facial heights, and posteroanterior face height ratio were similar in both groups. Maxillary length was slightly longer in the OSA group, whereas the mandibular length showed a slight increase in the control group. The axial inclination of the lower incisor to its respective plane was normal, whereas the upper incisor was significantly protrusive in the OSA group. Distance between the hyoid and mandible was significantly greater in the OSA group than in the controls, indicating that the hyoid bone was positioned more downward in the OSA group. They concluded that the patients with OSA demonstrated significant differences in several craniofacial measurements. OSA patients showed reduced midface length and inferiorly placed hyoid bone and tended to have smaller airway dimensions. Maltais F et al compared cephalometric radiographs of patients with sleep apnoea with those of snorers without sleep apnoea and those of non-snorers. Fifty two snorers with suspected sleep apnoea had a conventional sleep study and were divided into two groups: those with an apnoea-hypopnoea index greater than 10/h and those whose apnoea-hypopnoea index was 10/h or less. The cephalometric measurements in these patients were compared with those of 34 non-snoring control subjects. Controls were subdivided into two groups: control group 1 included 17 subjects similar in age to the sleep apnoea and snorer groups; control group 2 included 15 young men. The distance from the mandibular plane to the hyoid bone (MP-H) and the length of the soft palate were greater in the patients with sleep apnoea than in the snorers. The MP-H was similar in snorers and age matched control subjects, but was significantly greater in the older than in the younger control subjects. The soft palate was longer in subjects who snored (both sleep apnoea patients and snorers) than in control subjects. The MP-H distance significantly correlated with age for all subjects (snorers and controls) and for the control subjects alone. This study shows that non-apnoeic snorers have cephalometric abnormalities that differ from those of patients with sleep apnoea and that cephalometric values are influenced by the subject's age.[7, 8]

Narayanan A et al studied the correlation between lateral cephalogram, flexible laryngoscopy, and sleep study in patients diagnosed with obstructive sleep apnea (OSA). They studied the skeletal and soft tissue characteristics of proven OSA patients. A prospective study was performed in patients diagnosed with obstructive sleep apnea by sleep study. They were evaluated clinically and subjected to lateral cephalometry and nasopharyngo-laryngoscopy. The findings were matched to see if they corresponded to AHI of sleep study in severity. An attempt was made to see whether the data predicted the patients who would benefit from oral appliance or surgery as the definitive treatment in indicated cases. A retropalatal collapse seen on endoscopy could be equated to the distance from mandibular plane to hyoid (MP-H) of lateral cephalometry and both corresponded to severity of AHI. At the retroglossal region, there was a significant correlation with MP-H, length of the soft palate, and AHI. They concluded that there is significant correlation of lateral cephalogram and awake flexible nasopharyngo-laryngoscopy with AHI in OSA.

Battagel JM, et al analysed the upright lateral cephalometric radiographs of 115 dentate, Caucasian males. Forty-five subjects exhibited proven obstructive sleep apnoea (OSA), 46 were simple snorers, and the remaining 24 subjects, who had no history of respiratory disease and did not snore, acted as controls. Radiographs were traced and digitized, and comparisons were made of the dento-skeletal, soft tissue, and oropharyngeal features of the three groups. Differences were also sought between the snoring and OSA subjects. Of the hard tissue measurements, only the cranial base angle and mandibular body length showed significant inter-group differences. When the airway and associated structures were examined, both snorers and OSA subjects exhibited narrower airways, reduced oropharyngeal areas, shorter and thicker soft palates, and larger tongues than their control counterparts. Comparison of the two sleep disordered breathing groups showed no differences in any of the skeletal or dental variables examined. However in OSA subjects, the soft palate was larger and thicker, both lingual and oropharyngeal areas were increased and the hyoid was further from the mandibular plane. Thus, whilst the dento-skeletal patterns of snorers resembled those of subjects with OSA, some differences in soft tissue and hyoid orientation were apparent. There was not, however, a recognizable gradation in size of the airway and its associated structures from control through snoring to OSA subjects. This suggests that there may be a cephalometrically recognizable predisposition towards the development of sleep disordered breathing, but that this is only one facet of the condition.[9, 10]

CONCLUSION

From the results of present study, we observed non-significant difference between the pharyngeal dimensions of snorers and non-snorers.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

Cite this article as: Subhash Chandra, Akhilesh Tomar, Amit Kumar, Vinit Kumar Singh, Deepak Kumar, Neha Singh. Comparative Analysis of Snorers and Non-Snorers Using Cephalometric Analysis. Int J Med Res Prof. 2018 Nov; 4(6):183-86. DOI:10.21276/ijmrp.2018.4.6.038