J Oral Res
oral and craniofacial sciences

Communication

Snoring in individuals with and without maxillary constriction.

Zandalee A. Escobedo-Terrones[1] & Marcos J. Carruitero.[2]

Affiliations: [1]Dentist surgeon. Private Practice. [2]Stomatology School. Antenor Orrego Private University. Trujillo, Peru.

Corresponding author: Marcos J. Carruitero. Antenor Orrego Private University. Av. América Sur 3145 Monserrate. Trujillo. Perú. Phone: (051) 44604444. E-mail: m_carruitero@hotmail.com; mcarruiteroh@upao.edu.pe

Receipt: 02/20/2018 **Revised:** 03/14/2018
Acceptance: 03/30/2018 **Online:** 04/24/2018

Abstract: Objective: compare snoring in individuals with and without maxillary constriction. Methods: 124 individuals (mean age, 40.53; SD, 15.59), 81 women and 43 men were evaluated. Two groups were formed, 62 individuals with and 62 without maxillary constriction. To assess the snoring, a visual analog scale of snoring severity was used. Comparison of snoring scores between groups was performed by the U Mann-Whitney test. Simple and multiple linear regressions were also performed. Results: The mean snoring scores of the group with maxillary constriction was 3.00+/-2.96, while in the group without maxillary constriction it was 3.87+/-2.90. No statistically significant differences between snoring scores in individuals with and without maxillary constriction was found (p=0.105). The variability of snoring scores was not explained by the presence of maxillary constriction (p=0.100, R^2=2.20%). Conclusion: There was no different between the snoring scores in individuals with and without maxillary constriction. Maxillary constriction alone does not influence snoring.

Keywords: Snoring; maxillary constriction.

INTRODUCTION.

Breathing plays an important role in the origin of malocclusions.[1] There are two relevant breathing disorders that appear during sleeping: obstructive sleep apnea and snoring.[2] The latter has been slightly studied in dentistry and could be associated with the morphology of the maxilla.

Snoring is a sound vibration that occurs in the upper airway, usually during the inspiratory phase of respiration, and almost always during sleep. It is due to vibration of the uvula and soft palate. When an individual falls asleep in the supine position, muscle relaxation causes the base of the tongue to get close to the rear wall of the pharynx.

The reduced air flow increases the speed of air flow in order to maintain the necessary oxygen supply to the lungs, causing vibration of the soft tissues, producing snoring.[3] Its pathological importance varies from simple snoring to obstructive sleep apnea syndrome, but in all cases, there is a degree of airway obstruction with the corresponding chronic choking.[4]

Indicators of snoring in individuals include: being overweight, age, alcohol consumption, use of sedatives, growth of tonsils and uvula, long soft palate, macroglossia, micrognathia, frequent throat infections, deviated septum, nasal obstruction, sedentary lifestyle, smoking.[5] The influence of some dentofacial characteristics[1] and the dental arch morphology[2] has also been reported; nevertheless, is not clear if maxillary

Conflict of interests: The authors declare no conflicts of interest.

Ethics approval: Permanent Research Committee of the School of Stomatology (Code: 01162015FMEHUUPAO).

Funding: None.

Authors' contributions: Both authors carried out the entire study, and approved the final manuscript.

Acknowledgements: None.

Cite as: Escobedo-Terrones ZA & Carruitero MJ. Snoring in individuals with and without maxillary constriction. J Oral Res 2018; 7(4):123-126.
doi:10.17126/joralres.2018.033

constriction could influence snoring.

Maxillary constriction consists of a hard palate alteration, characterized by an elevated central part with a steep arc, always ajar. Its origin lies in alterations such as adenoidal hypertrophy, which hinder normal nasal breathing and force mouth breathing; sometimes individuals present bad habits such as thumb sucking, among others. Its consequences fall mainly on the deformation of the upper dental arch, resulting in deleterious teeth positioning, which will prompt orthodontic correction.[6]

The existence of maxillary constriction could infringe on the tongue space displacing it to the throat during sleep due to lack of space; because of this, maxillary constriction can be a risk factor for snoring, as well as obstructive sleep apnea.[7] This possible influence is not clear and there are no reported studies regarding the evaluation of snoring in individuals with maxillary constriction.

Thus, the objective of the present study was to compare the scores of snoring in subjects with and without maxillary constriction. It was hypothesized that maxillary constriction affects snoring.

MATERIALS AND METHODS.

Study sample

The present study had a cross-sectional and comparative design. It was conducted with 124 subjects (81 women, mean age 40.33, SD+/-15.98; and 43 men-mean age 40.91, SD+/-14.99-) between 18 and 84 years old (mean 40.53, SD+/-15.59) from the Dentistry and Otolaryngology services of the Regional Hospital of Trujillo-Peru, who met the selection criteria. The sample size was calculated using an estimated difference of 3.50 between scores obtained from a pilot study. A statistical power of 90% and a confidence level of 99% was considered.

The minimum sample size calculated was 25 per group but it was decided to increase the number to 62 in order to improve representation. The selection method was the non-probabilistic consecutive method. Inclusion criteria were: patient of ambulatory consultation with presence of at least maxillary premolars and molars, and having a roommate. Exclusion criteria, according to the clinical history and to the personal interview, were: overweight individuals, alcohol consumption, use of sedatives, history of uvula or tonsils alterations, macroglossia, throat infections, nasal septum deviation, micrognathia or smoking habit.

The study protocol was approved by a Stomatology Permanent Research Committee of Trujillo-Peru (code: 01162015FMEHUUPAO). All individuals signed an informed consent before participating in the study.

Evaluation of maxillary constriction

Individuals underwent a clinical examination to determine the presence or absence of maxillary constriction until the estimated sample size was reached. The following characteristics were considered for diagnosing maxillary constriction:

1) Dome palate, narrow and high, 2) narrow arch form, with possible unilateral or bilateral cross bite.[8]

Evaluation of snoring

After individual selection, his/her roommate was interviewed to determine the presence of snoring using a 10-score visual analog scale (VAS) of snoring severity.[9]

Method error

The method error was performed evaluating 10 individuals. To determine the concordance of the inter-evaluator and intra-evaluator diagnosis of maxillary constriction, a second observation was done after 2 weeks. Cohen's unweighted kappa index was used, and the concordances were found to be substantial and almost perfect with values of 0.92 and 0.84 respectively (p<0.01). The agreement between the measurements of snoring scores given by the roommate were evaluated twice (second observation after 2 weeks) by the Intraclass Correlation Coefficient (ICC) test (ICC=0.98, p<0.01).

Statistical Analysis

The data was stored and processed using the statistical software STATA version 12 (StataCorp, Texas, USA). The means median, standard deviations and minimum and maximum snoring scores were calculated.

Data did not follow normal distribution after applying the Shapiro-Wilk test, so comparison of snoring was performed by U-Mann Whitney test. A significance level of 5% was considered. To complement the analysis, simple and multiple linear regressions were also performed.

ISSN Online 0719-2479 - www.joralres.com © 2018

Table 1. Comparison of 10-score visual analog scale (VAS) of snoring severity in individuals with and without maxillary constriction.

Group		Maxillary constriction	n	Mean	Median	SD	Min.	Max.	*p**
Entire sample		Yes	62	3.00	2.5	2.96	0	9	0.105
		No	62	3.87	4.0	2.90	0	10	
		Total	**124**	**3.44**	**3.5**	**2.95**	**0**	**10**	
Sex	Female	Yes	40	2.78	1.5	3.20	0	9	0.134
		No	41	3.83	4.0	2.85	0	10	
		Total	**81**	**3.31**	**4.0**	**3.05**	**0**	**10**	
	Male	Yes	21	3.52	3.0	2.44	0	9	0.669
		No	22	3.73	4.0	3.07	0	10	
		Total	**43**	**3.67**	**3.0**	**2.75**	**0**	**10**	
Age groups	≤40	Yes	29	2.79	2.0	2.83	0	8	0.138
		No	34	3.88	4.0	2.74	0	10	
		Total	**63**	**3.38**	**3.0**	**2.81**	**0**	**10**	
	>40	Yes	33	3.18	3.0	3.10	0	9	0.359
		No	28	3.86	4.0	3.14	0	10	
		Total	**61**	**3.49**	**4.0**	**3.11**	**0**	**10**	

* ***p*-value:** U-Mann Whitney. **SD:** standard deviation

RESULTS.

No statistically significant difference between snorer individuals (40.5+/-15.6) with and without maxillary constriction was found (p=0.105). The mean snoring scores of the group with maxillary constriction was 3.00+/-2.96, while it was 3.87+/-2.90 in the group without maxillary constriction. Similar results regarding sex and age were found (Table 1).

After simple and multiple linear regression, it was found that the variability of snoring scores was not explained by the presence of maxillary constriction in the whole studied sample (p=0.100, R^2=2.20 %), neither when including sex and age groups (p values >0.05, R^2 =2.60 %).

DISCUSSION.

Snoring almost always happens during sleep due to palatal muscle relaxation, which causes the base of the tongue to get closer to the rear wall of the pharynx, the air flow is reduced and its flow rate increases in order to maintain the necessary oxygen supply to the lungs, this causes the vibration of the soft tissues, producing snoring.

In the present study, it was hypothesized that maxillary constriction affects snoring. Maxillary constriction could infringe on tongue space, forcing it to the throat during the nocturnal deglution when sleeping.[8] Nevertheless, the results showed that there was no statistically significant difference between snorer individuals with and without maxillary constriction, and also no significant differences were found regarding sex and age groups.

One possible explanation for the present results is that the sample was constituted mainly by adults, which differs from Rossi *et al.*,[2] who showed that dental arch morphology is altered in young people with breathing disorders. In addition, Lee *et al.*,[10] found that the prevalence of high arched palate, tongue indentation, long uvula, large tonsil and retrognathia was significantly higher in the high-risk of snoring group in young people. Another reason could be that the principal factors of snoring are related to soft tissues and not necessary to the shape of the maxilla. This is illustrated by Samimi *et al.*,[9] who observed that snoring decreased significantly in individuals following uvulopalatoplasty, compared to the preoperative period.

One possible limitation of this study is the diagnostic method used to measure snoring; however, the scale used has been previously reported by studies with interesting results. Although the findings of this study may serve as a reference for future research, similar studies[9] are suggested using alternative methods to analyze the relationship between snoring and maxillary constriction.

Snoring is caused by a vibration of soft tissue in the upper airway induced by respiration during sleep. It is triggered by relaxation of the upper airway dilator muscles that occurs during sleep. Multiple risk factors for snoring have been described, including morphological maxillary factors.[3] Nevertheless, the maxillary constriction by itself seems not to affect the source of snoring, thus clinicians should pay careful attention to this condition, considering it as a multifactorial alteration, before making treatment plan decisions.

CONCLUSION.

There was no different in the snoring scores of individuals with and without maxillary constriction. Maxillary constriction by itself does not affect snoring.

Similar studies are suggested using alternative diagnostic methods to analyze the relationship between snoring and maxillary constriction.

REFERENCES.

1. Rossi RC, Rossi NJ, Rossi NJ, Yamashita HK, Pignatari SS. Dentofacial characteristics of oral breathers in different ages: a retrospective case-control study. Prog Orthod. 2015;16:23.
2. Al-Hussaini A, Berry S. An evidence-based approach to the management of snoring in adults. Clin Otolaryngol. 2015;40(2):79–85.
3. Stuck BA, Dreher A, Heiser C, Herzog M, Kühnel T, Maurer JT, Pistner H, Sitter H, Steffen A, Verse T. Diagnosis and treatment of snoring in adults-S2k Guideline of the German Society of Otorhinolaryngology, Head and Neck Surgery. Sleep Breath. 2015;19(1):135–48.
4. Banhiran W, Junlapan A, Assanasen P, Chongkolwatana C. Physical predictors for moderate to severe obstructive sleep apnea in snoring patients. Sleep Breath. 2014;18(1):151–8.
5. Maspero C, Giannini L, Galbiati G, Rosso G, Farronato G. Obstructive sleep apnea syndrome: a literature review. Minerva Stomatol. 2015;64(2):97–100.
6. Li Y. Early orthodontic treatment of skeletal Class II malocclusion may be effective to prevent the potential for OSAHS and snoring. Med Hypotheses. 2009;73(4):594–5.
7. Huynh NT, Morton PD, Rompré PH, Papadakis A, Remise C. Associations between sleep-disordered breathing symptoms and facial and dental morphometry, assessed with screening examinations. Am J Orthod Dentofacial Orthop. 2011;140(6):762–70.
8. Johal A, Conaghan C. Maxillary morphology in obstructive sleep apnea: a cephalometric and model study. Angle Orthod. 2004;74(5):648–56.
9. Samimi Ardestani SH, Dadgarnia MH, Baradaranfar MH, Mazidi M, Rabbani M, Behniafard N, Baradaranfar A. Radiofrequency uvulopalatoplasty for primary snoring. Acta Med Iran. 2013;51(8):530–6.
10. Lee YC, Eun YG, Shin SY, Kim SW. Prevalence of snoring and high risk of obstructive sleep apnea syndrome in young male soldiers in Korea. J Korean Med Sci. 2013;28(9):1373–7.

ISSN Online 0719-2479 - www.joralres.com © 2018