

Research Article

Gender and Age Influences on Soft Tissue Lateral Cephalometric Analysis among Snorers and Non Snorers: A Case Control Study

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Article History

Received: 19.01.2020

Accepted: 20.02.2020

Published: 29.02.2020

Journal homepage:

<https://www.easpublisher.com/easjdom>

Quick Response Code



Abstract: *Purpose:* Snoring contemplated to be sleep disordered breathing (SDB) owing itself to physical and structural and functional changes in both hard as well as soft tissue components in orofacial and pharyngeal regions. *Materials and Methods:* The study was conducted with 30 males and 30 females and all the 60 participants were distributed equally into 3 age groups: 21-30 years, 31-40 years and 41-50 years. Digital lateral cephalogram were produced and analyzed. Parameters analyzed were length and maximum width of soft palate and distance to pharynx from maximum width and tip of soft palate. Distance of pharynx from tip of soft palate was also compared among snorers and non snorers. *Results:* Length and maximum width of soft palate was found to be more in both snorers and non snorers male population compared to female population. Distance to pharynx from maximum width was found to be marginally more among female snorers and non snorers. Age group variations although statistically insignificant and no definite co relation could be established pharyngeal space was found to be more in third decade of life as compared fourth and fifth decades. *Conclusion:* Lateral cephalometric analysis was henceforth proved to determine marginal soft tissue changes and also having an advantage of having cost effectiveness and less detrimental owing to reduced exposure parameters with help in opening the gates for more understanding of age and gender influences among snorers.

Keywords: Snorers, Soft palate, pharynx. Cephalometric analysis.

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INTRODUCTION

Snoring a vibratory noise during generated during inspiration which is otherwise falls in the horizon of sleep disordered breathing ranging from simple snoring to obstructive sleep apnea syndrome (Cho, J. H. *et al.*, 2013; & Nishimura, T. 2003). Habitual snoring is analogous with most times hypertension, infarction and deleterious effects on cardiovascular systems (Counter, P., & Wilson, J. A. 2004). Soft palate vibration has been associated with snoring sound with obstructive sleep apnea (OSA) is to considered to be a partial or complete obstruction dominantly associated with soft palate (Cho, J. H. *et al.*, 2013). Snorers were divided into occasional and habitual snorers (Ramanathan, I., & Revathi, I. 2005). Soft tissues parameters significantly length and maximum width of soft palate as well as the distance of pharynx from maximum width of soft palate were seen to be dominant factors responsible for snoring

established by us in our previous study (Maiti, S.b. *et al.*, 2018).

This study further aims at understanding significance of distance of pharynx from tip of soft palate in level of oropharynx along with gender and age influences on various soft tissue parameters in adults accountable for development of snoring.

MATERIALS AND METHODS

A total of 60 participants were selected for the study out of 80 individuals who volunteered to participate in the study. All volunteers were subjected to questionnaire based on snoring with only those individuals who have revealed a history of habitual snoring were selected for the particular study. Any individual with craniofacial abnormalities or asymmetries, individuals undergoing orthodontic treatment or patient with history pertaining to neuromuscular and endocrine disorders were excluded

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from study. Out of these 60 participants 30 were study group individuals and 30 were control group participants. Out of 30 participants in each group 15 were males and 15 were females. To analyze the influence of age on various soft tissue landmarks all the participants in both study and control groups were equally distributed in 3 age groups i.e from 21-30 years , 31-40 years and 41-50 years. To have a significant study procedure each group had equal number of males and females. Lateral cephalogram radiographs were produced on X MIND PANO D + radiographic unit and results were analyzed using inbuilt DIGORA FOR WINDOWS software. All individuals were asked to maintain natural head position with 75 kvp and 10mAs exposure parameters were maintained. Following soft tissue parameters were analyzed for the study.

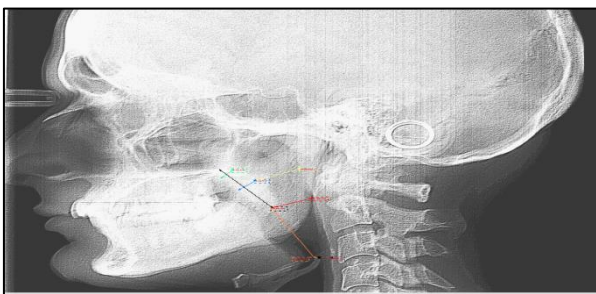


FIGURE 1: Black line represents length of soft palate, green line represents width of soft palate at junction, blue line-represents maximum width of soft palate, yellow line represents distance to pharynx from maximum width, red line represents distance to pharynx from tip of soft palate, orange line denotes distance to epiglottis from tip of soft palate and brown line represents distance to pharynx from epiglottis.

Soft Tissue Landmarks:

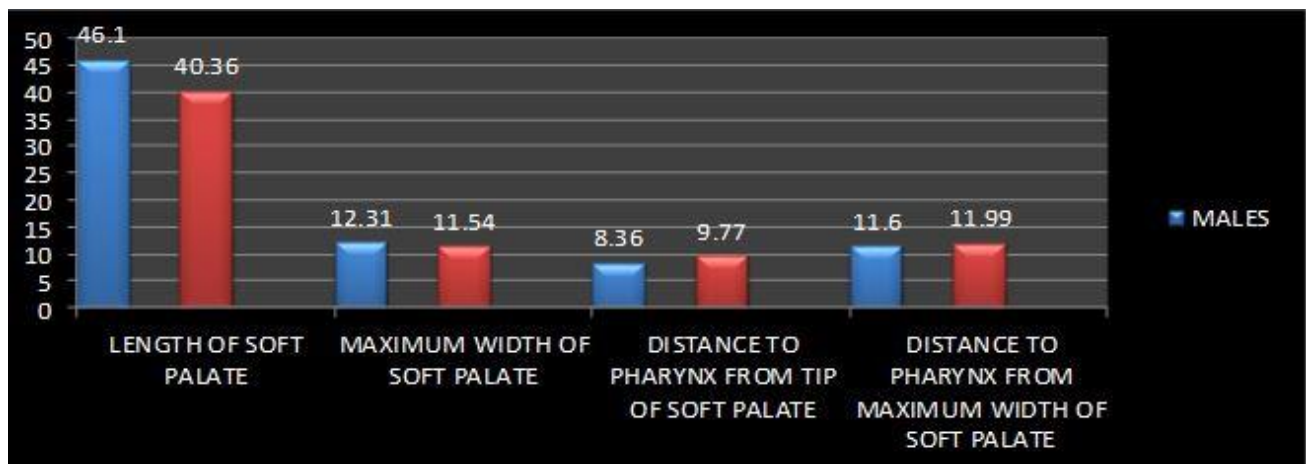
1. Length of the soft palate which was measured from junction of hard and soft palate till tip of the soft palate using multiple points for measuring the curvature
2. Distance of pharyngeal wall from tip of the soft palate with distance was also compared among snorers and non snorers
3. Maximum width of soft palate was measured between 2 points with one point on superiorly on oropharynx region and one point inferiorly on oral cavity
4. Distance of pharyngeal wall from the maximum width of soft palate

STATISTICAL ANALYSIS

The statistical analysis paired ‘t’ test was used for inter group study and One way annova and post hoc tests were conducted for intra group study. The data was analyzed using Microsoft excel 2007 and statistical procedure social services (SPSS 16.0) statistical software programme.

RESULTS

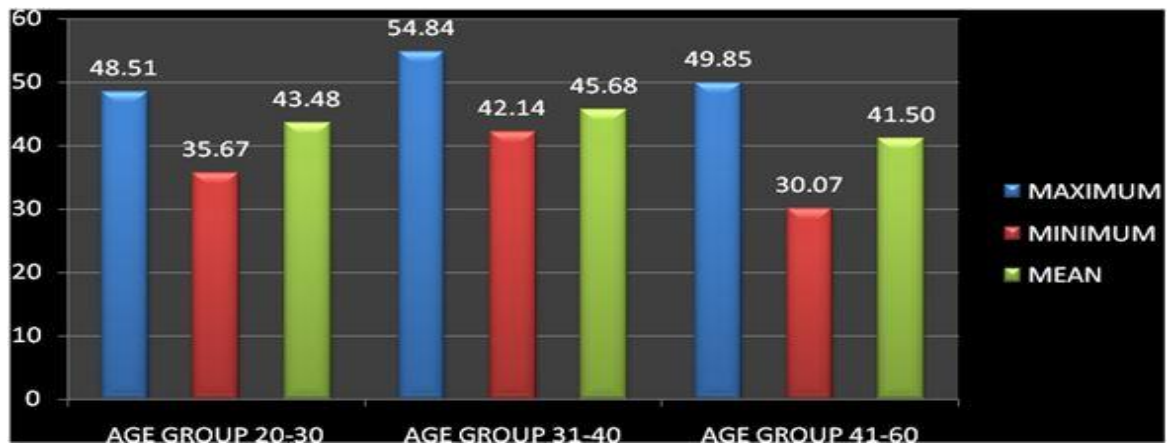
Length of the soft palate when analyzed or examined for gender study it was found to be more among males all study participants i.e in both snorers and non snorers and was found to be statistically significant ($p < .05$) (GRAPH 1).



Graph 1: Graph showing mean value of length of soft palate, maximum width of soft palate, distance to pharynx from maximum width of soft palate and distance to pharynx from tip of soft palate among male and female snorers.

The mean value for male snorers and non snorers was found to be 46.10 mm and 36.28 mm respectively while in females the values were 40.36 mm and 32.12 mm respectively. The influence of age revealed to be statistically insignificant ($p > .05$) with the

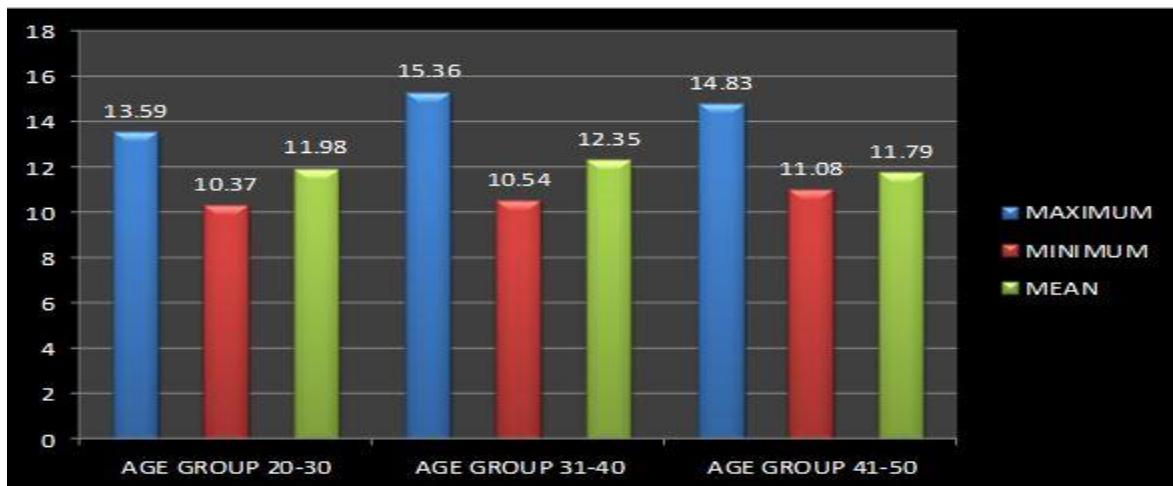
mean values for length of soft palate for snorers in age groups of 21-30, 31-40, 41-50 years were 43.48 mm, 45.9 mm and 41.5 mm respectively whereas among non snorers mean values were found to be 35.21 mm, 33.65 mm and 34.25 mm respectively (GRAPH 2).



Graph 2: Graph showing length of soft palate among snorers in different age groups.

Maximum width of soft palate showed similar results with male counterparts having more width than female counterparts in both snorers and non snorers and also found to be statistically significant ($p < .05$) (GRAPH 1). For male snorers and non snorers the mean value was found to be 12.31mm and 10.44 mm respectively whereas in female snorers and non snorers values were 11.54 mm and 8.39 mm

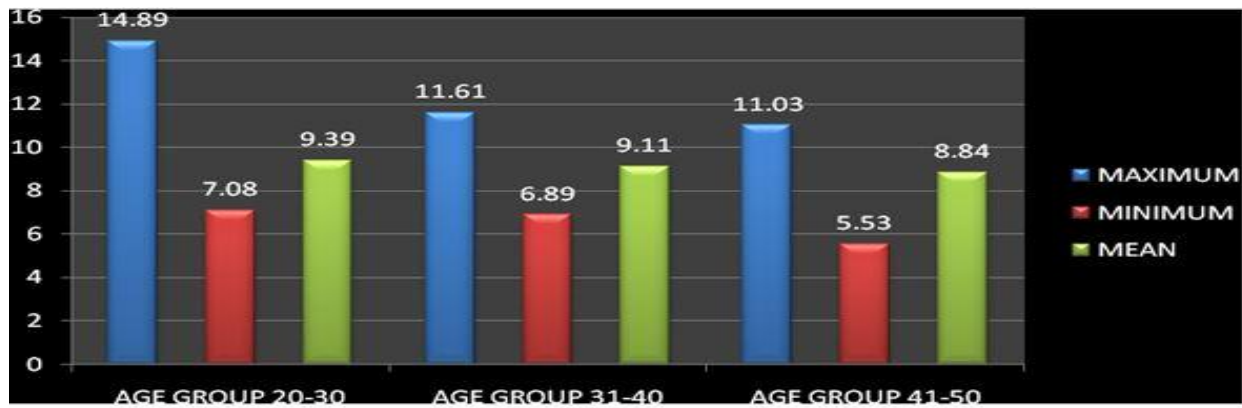
respectively. When compared in different age groups it was shown to have similar statistically insignificant results ($p > .05$). The mean values for all 3 age groups among snorers were found to be 11.98 mm, 12.35 mm and 11.79 mm respectively whereas among non snorers values were 9.79 mm, 10.23 mm and 9.88 mm respectively (GRAPH 3).



Graph 3: Graph showing maximum width of soft palate among snorers in different age groups

Distance of pharynx from tip of the soft palate was first compared among snorers and non snorers where mean values were 9.22 mm and 13.25 mm respectively and was found to be statistically significant ($p < .05$). The distance when subjected to gender comparison was found to be less among male snorers (mean value of male snorers-8.36 mm, mean value of female snorers 9.77, mean value of male non

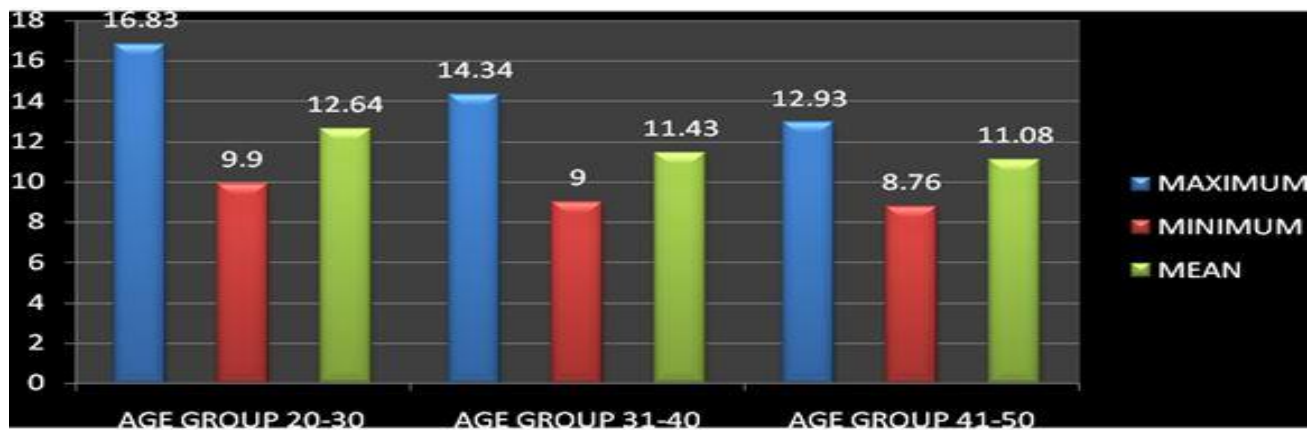
snorers 13.29 mm and female non snorers 13.15mm) (GRAPH 1). ($p < .05$). Age influences were found to be have no co proper correlation and was found to be statistically insignificant. Mean values were 9.39 mm, 9.11 mm and 8.84 mm in various age groups among snorers whereas among non snorers values were 13.89 mm, 12.94 mm and 12.91 mm respectively (Graph 4).



Graph 4: Graph showing distance to pharynx from tip of soft palate among snorers in different age groups

Distance of pharynx from maximum width of the soft palate when evaluated with gender of the participants was similar to above result and was found to be less among males compared to females (mean values for male snorers and non snorers were 11.60 mm and 15.14 mm and in female snorers and non snorers were 11.99 and 16.11mm) ($p < .05$) (GRAPH 1). Age

comparisons showed no pattern of correlation with results revealed to be statistically insignificant. Mean values were 12.64 mm, 11.43 mm and 11.08 mm in various age groups among snorers whereas among non snorers values were 16.47 mm, 15.22 mm and 15.35 mm respectively (GRAPH 5).



Graph 5: Graph showing distance to pharynx from maximum width of soft palate among snorers in different age group

DISCUSSION

Sleep which is a a vital indispensable part of every individual is rather the most least discussed condition significantly when it has been reported that 1 out of 7 americans are suffering from chronic sleep/wake disorder whereas according to a report published on TIMES OF INDIA on 13th march 2013 that 93% Indians are sleep deprived (Ramanathan, I., & Revathi, I. 2005; & Deka, J. 2015 Mar 13th).

According to study conducted by CHUANG *et al.*, in it is seen that both men and women shows an increase in snoring until age of 50-59 years which is then followed by decline in snoring which is less steep among women (Chuang, L. P. *et al.*, 2017). APPLETON *et al.*, in his study has shown to have more OSA symptoms (loud snoring, witnessed apneas) but were less likely to have insomnia compared to women (Appleton, S. *et al.*, 2018). The present study aims at evaluating and understanding various anatomical

parameters between males and female snorers as well as non snorers and between various age groups from from 21 years till 50 years.

In previous study conducted by us it has already shown that significant soft tissue parameters affecting the snorers were length and maximum width of the soft palate , distance of pharynx from maximum width of the soft palate as well as width of the tongue (Maiti, S.b. *et al.*, 2018). In a further study conducted by us that hard tissue parameters proving to be significant among snorers were length of the hard palate, distance of gonion from point B, distance of menton from point B, distance of hyoid bone from mandibular plane and menton along with height of ramus and width of mandible (Maiti, S.b., *et al.*, 2018).

The present study aims at evaluation various soft tissue parameters among males and female snorers as well as non snorers with distance of pharynx from tip

of soft palate was also evaluated among snorers and non snorers and evaluated for differences of the parameters in different age groups as well. The study reveals that males possess longer and thicker soft palate when compared to females in both snorers and non snorers and was also found to be statistically significant which also resembles somewhat the polysomnography studies conducted by WIMMS *et al.*, where women's have less severe OSA WITH LOWER APNEA HYPOPNEAS (AHI) and shorter apneas (Wimms, Aa. *et al.*, www.smjournals.com). Our study shows that these anatomical differences could be evaluated by using cost effective and easily available lateral cephalogram radiographic techniques. The pharyngeal airway space also found to be less among male snorers and non snorers when compared to female counterparts. These studies strikingly contrasting to the fact that women's have less neck circumference than males (Hingorjo, M. R. *et al.*, 2012). Present study has also shown to have less airway space at the level of oropharynx at the tip of soft palate in both snorers and non snorers with snorers having significantly less pharyngeal space than non snorers.

The parameters when subjected to different age group comparisons which is the first of its kind although did not shown to have any significant results or a definite pattern of anatomical variations though interestingly length and the maximum width of the soft palate was found to be more in age groups of 31-40 years among snorers and non snorers when compared to other age groups. Another interesting finding revealed was marginally more pharyngeal space in third decade of life as compared to fourth and fifth decades of life. Another striking feature although the length and width is seen to be more in age group of 31-40 years the pharyngeal space is found to be marginally less in age group of 41-50 years. Therefore the pattern seems to be variable and these findings open the channels for further studies of this pattern but the fact remains that the fourth and the fifth decade people are likely to be the sufferers. In accordance with our present study a previous study by GONCALVES *et al.*, has indicated an increase in the upper airway width and upper lip length with age, lower airway has exhibited variable growth between ages of 6 to 18 years (Gonçalves, R. D. C. *et al.*, 2011).

CONCLUSION

Therefore to conclude the present study has clearly indicated the understanding of gender and age group impacts on subtle anatomical variations and with help of easy available cost effective lateral cephalogram radiographs which should therefore help to design out

proper treatment procedures for in patients of different genders and age groups affected from snoring and obstructive sleep apnea and provide a better sleep life for every individual.

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