Age- and gender-related incisor changes in different vertical craniofacial relationships

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ABSTRACT

Objective: To investigate the age- and gender-related changes in upper and lower incisors' position and inclination in different vertical craniofacial relationships.

Materials and Methods: A retrospective study on patients' records of age 8–48 years. The sample was divided based on Frankfort mandibular plane angle into three groups; normal, high, and low angle groups. It was then subdivided according to age. Upper and lower incisors' inclinations and positions were assessed from lateral cephalometric radiographs. Gender and age associations and effects size were calculated using two-way ANOVA tests. Significance level was set at $P < 0.05$.

Results: Four hundred and twenty records ($F = 272$, $M = 148$) were included; 115 had normal, 81 low, and 250 had high vertical relationships with no significant age and gender distribution differences ($P > 0.05$). All significant associations and effects were found in the low angle group only. A significant association was found between gender and upper incisor inclination ($P < 0.05$) with medium effect size ($0.13 \leq \eta_p^2 < 0.26$). An association is also found between age × gender interaction and upper incisor inclination and lower incisor position ($P < 0.05$) with large effect size ($0.26 \leq \eta_p^2$).

Conclusion: Age- and gender-related upper and lower incisor changes were found to be significant in subjects with decreased vertical skeletal pattern only. The upper incisor inclination and the lower incisor position were the most affected variables with age and gender.

Key words: Age, craniofacial relationship, gender, incisor inclination, vertical

INTRODUCTION

Incisors are the most anterior teeth in the mouth. Multiple extraoral and intraoral forces and factors could impact their inclination and position.[1] At the same time, their position and inclination show a direct and indirect impact on the upper and lower lip positions.[2,3] They also play a major role in the rest and dynamic smile esthetics.[4] As facial soft tissue positions are becoming extremely important in contemporary orthodontic treatment planning,[5,6] understanding incisor inclination changes with age is crucial in visioning long-term professional treatment efficiency.

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Upper incisor inclination was found to have an effect on the vertical[7] and horizontal[8] position of point A as assessed on cephalometric radiographs. However, such effect was reported to be small, of no clinical relevance and was still controversial.[8] Upper incisors were also found to significantly affect the perioral soft tissue measurements and upper lip strain in Class II division 1 malocclusion cases.[9] Concomitantly, the lip position and thickness were found to significantly affect the upper incisor inclination.[10]

Lower incisor inclination was found to be significantly affected by the vertical facial pattern.[1,11] Long-face facial pattern showed more proclined and extruded lower incisors than short-face facial pattern.[11] It was also found to be significantly correlated with gender, age,[1] and symphyseal depth.[1,12] Lower incisors were also found to be more extruded in Class III subjects with negative overjet as compared to Class I subjects.[11] However,

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no significant association was reported between changes in lower incisor inclination and point B position as assessed on cephalometric radiographs.[7,8]

Aging is a natural biological and physiological process. Oral and perioral structures, as part of the human body, face multiple changes and adaptation with aging. As person ages, the muscles' ability to create a smile decreases causing the smile to become narrower vertically and wider transversely.[13,14] Despite the minor gender differences in upper and lower lip changes with age, maxillary incisor display was found to decrease with age, whereas the mandibular incisor display tended to increase with age.[14-17] This might be explained by the increased resting upper lip length,[16] decreased upper lip thickness, and decreased lower lip elevation with age.[17] Such changes highlighted the importance of including the effect of age and gender on the long-term facial balance within the orthodontic treatment plan.[14,18]

The biting forces on the incisors were also shown to vary with age with a peak at 14 years of age for females and 15 years for males.[19] Such forces might contribute to age-related changes in incisor inclination. Racial differences in dentofacial and soft tissue morphology, as proved by multiple studies, might also be a contributing factor in age-related changes of incisors' inclination.[5,6,18,20-24]

The aim of this study is to investigate the age- and gender-related changes in the upper and lower incisors' inclination and position in different vertical craniofacial relationships.

MATERIALS AND METHODS

This was a retrospective study with a sample comprising pretreatment records of patients from the outpatient clinic of the Department of Orthodontics, at King Abdulaziz University, Jeddah, Saudi Arabia. The study was approved by the Ethical Committee as it involved data of patients.

The selection of patients' records included the following criteria: (1) Age ranged from 8 to 48 years, (2) no history of orthodontic treatment, (3) no craniofacial disorders such as cleft palate, and (4) pretreatment lateral cephalometric radiographs must be present. Records of 800 randomly selected patients' files were then screened of which 420 files fulfilled the selection criteria.

Lateral cephalometric radiographs of the selected cases were traced and analyzed by a trained examiner to identify the followings; vertical skeletal relationship, upper and lower incisors' inclinations and positions.

The samples were divided into 3 groups based on the vertical skeletal relationship. The latter was defined based on Frankfort Mandibular plane angle (FMA) as; normal (FMA 23°–27°), low angle (FMA < 23°), and high angle (FMA > 27°) vertical skeletal pattern. The sample was further subdivided into different age groups with small intervals considering the wide range of dental changes from early mixed to adulthood. The adulthood was further divided into groups putting into consideration age changes in periodontal support. Accordingly, the age group distribution in the current study was set as follows;

(8–9 years); (>9–11 years); (>11–13 years); (>13–15 years); (>15–17 years); (>17–19 years); (>19–25 years); (>25–30 years); (>30–35 years); (>35 years).

The upper and lower incisors were then assessed as follows:

- The upper incisors' inclination was measured as upper incisor/numerical aperture (NA) angle: (average = 22° ± 2)
- The upper incisors' position was measured as upper incisor/NA distance (mm): (average = 4 mm ± 2)
- The lower incisors' inclination was measured as lower incisor/Mandibular plane (MP) angle: (average = 90° ± 2)
- The lower incisors' position was measured as lower incisor/NB distance (mm): (average = 4 mm ± 2).

Statistical Analysis

Before data collection, ten cases were randomly selected and the assessed variables were recorded twice with 2 weeks apart to calculate the intraexaminer reliability. The kappa statistics of intraexaminer consistency were 0.80 for the angular variables and 0.90 for the linear variables assessed.

Descriptive statistics and group comparison between the different study groups were calculated for mean age differences using one-way ANOVA, and for gender difference using Chi-square test.

The data were then compared to the association and effect sizes of age and gender on the upper and lower incisors' inclination and position changes in different vertical skeletal relationships using two-way ANOVA and Eta partial measurement (η_p^2) (gender, factor 1; age-group, factor 2; age × gender interaction). Effect size values of $0.02 \leq \eta_p^2 < 0.13$ were considered small, $0.13 \leq \eta_p^2 < 0.26$ considered medium, and $0.26 \leq \eta_p^2$ considered large.[18] All statistical analyses were done using SPSS 16.0 software (SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc.). The significance level was set at $P < 0.05$.

RESULTS

The studied sample consisted of 272 females and 148 male subjects; 115 had normal, 55 had low, and 250 had high angle vertical skeletal relationship. The sample distribution among the different age groups is presented in Table 1.

No significant age ($P = 0.138$) and gender ($P = 0.715$) distribution differences were found between the different vertical craniofacial relationships [Table 1].

The results indicated a significant difference between male and female in the upper incisors' inclination in the low angle group only ($P < 0.05$). No significant gender difference was found in the upper and lower incisors' position changes among all studied groups, as well as the upper incisor inclination in the normal and high angle groups ($P > 0.05$). Gender was shown to have no effect on incisors' changes except for a reported medium effect ($0.13 \leq \eta_p^2 < 0.26$) on the upper incisor inclination in the low angle group only with no effect on the normal and high angle groups [Figures 1 and 2].

The results indicated no significant difference between the different age groups in the upper and lower incisors' changes among the three studied groups ($P > 0.05$). The effect of age on incisors' changes was also found to be small ($0.02 \leq \eta_p^2 < 0.13$) in the normal and high angle groups. However, in the low angle group, the effect of age was found to be medium ($0.13 \leq \eta_p^2 < 0.26$) for the upper and lower incisors' position changes and large ($0.26 \leq \eta_p^2$) for the upper and lower incisor inclination [Figures 1 and 2].

Results further indicated that age × gender interaction had a significant effect ($P < 0.05$) on the upper incisor inclination and the lower incisor position changes in the low angle group only. Such interaction also showed a medium effect ($0.13 \leq \eta_p^2 < 0.26$) on the lower incisors' inclination changes and large effects ($0.26 \leq \eta_p^2$) on the upper incisor inclination and upper and lower incisors' position changes but also in the low angle group only [Figures 1 and 2].

Table 1: Sample distribution

Vertical relationships	Gender		Total (*n*)
	Female (*n*)	Male (*n*)	
Normal			
Age groups			
≤10	0	0	0
>10-15	55	21	76
>15-20	11	7	18
>20-25	9	4	13
>25-30	4	1	5
>30	2	1	3
Total *n* (%)	81 (70.4)	34 (29.6)	115 (100)
Low			
Age groups			
≤10	5	1	6
>10-15	19	12	31
>15-20	7	4	11
>20-25	2	2	4
>25-30	2	1	3
Total (%)	35 (63.6)	20 (36.4)	55 (100)
High			
Age groups			
≤10	20	12	32
>10-15	93	50	143
>15-20	24	17	41
>20-25	9	10	19
>25-30	6	4	10
>30	4	1	5
Total (%)	156 (62.4)	94 (37.6)	250 (100)
Total			
Age groups			
≤10	25	13	38
>10-15	167	83	250
>15-20	42	28	70
>20-25	20	16	36
>25-30	12	6	18
>30	6	2	8
Total (%)	272 (64.8)	148 (35.2)	420 (100)
P		0.715	

DISCUSSION

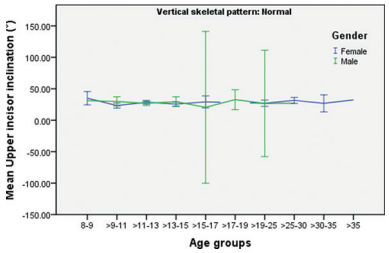
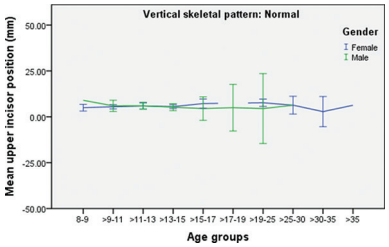
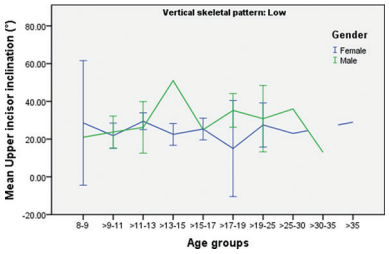
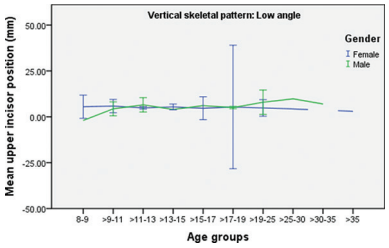
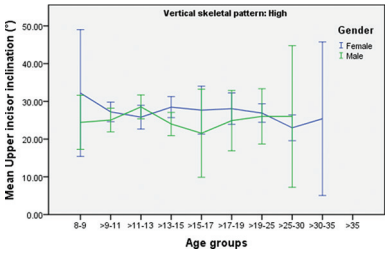
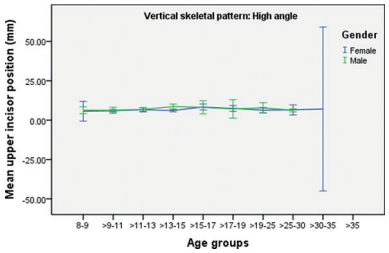
Multiple studies have shown that incisors' inclination and position varied among different malocclusions,[9] as well as with different vertical growth patterns.[1,11,12,25] Gütermann *et al*.[1] reported that the lower incisors become more retroclined in subjects with more pronounced divergent jaws and with more obtuse gonial angle. Such finding was found to be related to the subject's gender, age, and vertical skeletal pattern.[1] However, the age group in Gutermann's study was all growing (8–16 years only), as well as only significance of associations was assessed, but the effect size of age and gender on lower incisors' inclination was not studied. Similarly, Molina-Berlanga *et al*.[11] evaluated the lower incisors' compensations in Class I and Class III skeletal malocclusions with different vertical facial patterns in adult patients. They found that Class I high angle cases and Class III high and normal angle cases had more retroclined lower incisors.[11] Multiple other studies evaluated incisor changes but in adult patients also.[12,25] To the best of our knowledge, limited studies assessed the effect size of age and gender on incisors' inclination and position changes on a broad range of age groups, and thus comparisons of results seem difficult.

The effect size has been calculated in the current study to give a better understanding of the findings. The *P* value only indicates if there is an effect or not and is dependent on the sample size. In contrary, the effect size is the raw finding that shows the magnitude of the effect of the findings and is not related to the sample size. Thus, statisticians advocated to interpret both the effect size and the statistical significance (*P*-value) for stronger and meaningful interpretation.[26]

Accordingly, the current findings showed that the only changes that were significant and had a clinically acceptable impact, with medium to large effect sizes, were the effect of gender on the upper incisors inclination, and effect of age and gender interaction on the upper incisor inclination and the lower incisor position changes. Such findings were not significant except in subjects with decreased vertical relationships.

Multiple studies have shown that the perioral soft tissue structures have an effect on the upper incisors, especially

Figure 1: Significance and effect size of age and gender on upper incisor inclination and position changes among the 3 studied groups. Significant using two-way ANOVA at $^{*}P<0.05$, $^{**}P<0.01$, $^{***}P<0.001$; and effect size $^{*}\eta_p^2$= small, $^{**}\eta_p^2$= medium, $^{***}\eta_p^2$= large

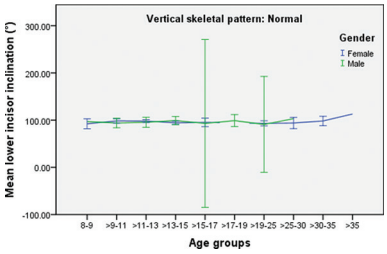
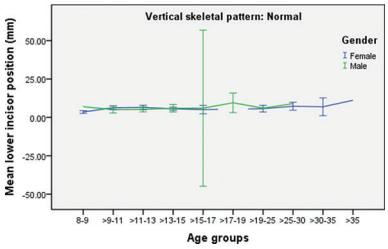
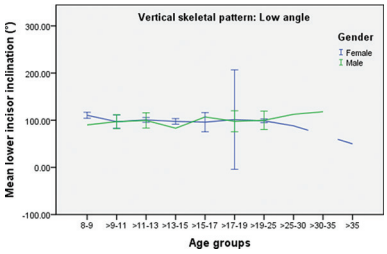
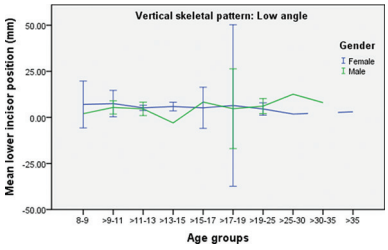
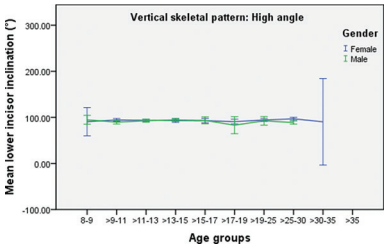
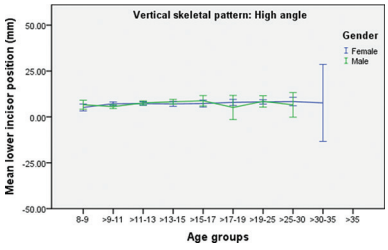
Gp	Upper incisors' inclination (Upper incisor/NA angle)	Upper incisors' position (Upper incisor/NA distance)
Normal	 Gender: df (1,98); F (0.39); *P* (0.53); η_p^2 (0.00) Age: df (9,98); F (0.59); *P* (0.79); $^{*}\eta_p^2$ (0.05) Age × Gender: Df (6,98); F (1.45); *P* (0.20); $^{*}\eta_p^2$ (0.08)	 Gender: df (1,98); F (0.09); *P* (0.77); η_p^2 (0.00) Age: df (9,98); F (0.64); *P* (0.76); $^{*}\eta_p^2$ (0.06) Age × Gender: Df (6,98); F (0.96); *P* (0.46);$^{*}\eta_p^2$ (0.06)
Low angle	 Gender: df (1,37); F (7.07); $^{*}P$ (0.01); $^{**}\eta_p^2$ (0.16) Age: df (9,37); F (1.81); *P* (0.10); $^{***}\eta_p^2$ (0.31) Age × Gender: df (7,37); F (2.98); *P (0.01); $^{***}\eta_p^2$ (0.36)	 Gender: df (1,37); F (0.02); *P* (0.89); η_p^2 (0.00) Age: df (9,37); F (1.04); *P* (0.43); $^{**}\eta_p^2$ (0.20) Age × Gender: df (7,37); F (1.95); *P* (0.09); $^{***}\eta_p^2$ (0.27)
High angle	 Gender: df (1,233); F (3.15); *P* (0.07); η_p^2 (0.01) Age: df (8,233); F (0.33); *P* (0.95); η_p^2 (0.01) Age × Gender: df (7,233); F (1.52); *P* (0.16); $^{*}\eta_p^2$ (0.04)	 Gender: df (1,233); F (0.85); *P* (0.36); η_p^2 (0.00) Age: df (8,233); F (0.88); *P* (0.54); $^{*}\eta_p^2$ (0.03) Age × Gender: df (7,233); F (0.87); *P* (0.53); $^{*}\eta_p^2$ (0.03)

the upper lip.[10,27] Shamlan and Aldrees further confirmed that the upper and lower incisors influenced the upper lip length and lower lip position.[27] Other studies have shown that the upper lip height, length, and muscle tone changed with age.[15,17] Sforza *et al*.[18] assessed the age- and gender-related changes in positions of the nose, lips, and chin on 654 healthy, native Northern Sudanese subjects from childhood to young adulthood. Despite their reported age and gender effects on the perioral structures, they also emphasized the importance of ethnic variability in such fields of study. None of the previous studies, however, took the vertical skeletal pattern into consideration which made comparisons and correlations with the current findings inapplicable.

Malocclusion, incisors' vertical position, as well as anteroposterior skeletal and vertical skeletal patterns are major factors in any dentofacial balance. Thus, for better interpreting the results when analyzing age- and gender-related dentofacial changes, the latter variables should be considered. In addition, findings should be ethnic related for in-depth meaning.

As a cross-sectional study, age-related changes might not represent the true growth and development as much as they represent an estimate of the actual biological nature of the subject at that period of time. Thus, for a true growth effect, a longitudinal study might be the best research design, which might be difficult to conduct because of the high drop outs due to the long-term nature of such researches.

Figure 2: Significance and effect size of age and gender on lower incisor inclination and position changes among the three studied groups using two-way ANOVA at $^{*}P<0.05$, $^{**}P<0.01$, $^{***}P<0.001$; and effect size $^{*}\eta_p^2$= small, $^{**}\eta_p^2$= medium, $^{***}\eta_p^2$= large

Gp	Lower incisors' inclination (Lower incisor/MP)	Lower incisors' position (Lower incisor/NB distance)
Normal	 Gender: df (1,98); F (0.13); *P* (0.71);η_p^2 (0.00) Age: df (9,98); F (0.62); *P* (0.78); $^{*}\eta_p^2$ (0.05) Age × Gender: df (6,98); F (0.66); *P* (0.69); $^{*}\eta_p^2$ (0.04)	 Gender: df (1,98); F (0.68); *P* (0.41); η_p^2 (0.01) Age: df (9,98); F (1.32); *P* (0.24); $^{*}\eta_p^2$ (0.11) Age × Gender: Df (6,98); F (0.83); *P* (0.55); $^{*}\eta_p^2$ (0.05)
Low angle	 Gender: df (1,37);F (0.02);P (0.89);η^2 (0.00) Age: df (9,37); F (1.55); *P* (0.16); $^{***}\eta_p^2$ (0.27) Age × Gender: df (7,37); F (1.73); *P* (0.13); $^{**}\eta_p^2$ (0.25)	 Gender: df (1,37);F (0.12); *P* (0.73);η_p^2 (0.00) Age: df (9,37); F (1.19); *P* (0.33); $^{**}\eta_p^2$ (0.22) Age × Gender: df (7,37); F (2.75); $^{*}P$ (0.02); $^{***}\eta_p^2$ (0.34)
High angle	 Gender: df (1,233); F (2.13); *P* (0.15); η_p^2 (0.00) Age: df (8,233); F (0.98); *P* (0.46); $^{*}\eta_p^2$ (0.03) Age × Gender: df (7,233); F (1.12); *P* (0.35); $^{*}\eta_p^2$ (0.03)	 Gender: df (1,233); F (0.10); *P* (0.75); η_p^2 (0.00) Age: df (8,233); F (1.43); *P* (0.19);$^{*}\eta_p^2$ (0.05) Age × Gender: df (7,233); F (1.54); *P* (0.15); $^{*}\eta_p^2$ (0.04)

CONCLUSION

Age- and gender-related upper and lower incisor changes in inclination and position were found to be significant in subjects with decreased vertical skeletal pattern only. Such findings are important to consider in predicting orthodontic treatment plans, especially for patients with decreased vertical skeletal relationship.

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Conflicts of Interest

The submitting authors and their affiliated institutions have no any conflict or financial interest in relation to the publication of this manuscript nor manufacturers, commercial products or providers of commercial services is mentioned in its content.

REFERENCES

1. Gütermann C, Peltomäki T, Markic G, Hänggi M, Schätzle M, Signorelli L, *et al.* The inclination of mandibular incisors revisited. Angle Orthod 2014;84:109-19.
2. Bourzgui F, Alami S, Sebbar M, Derkaoui T, Hamza M, Serhier Z, *et al.* Effect of orthodontic treatment on lip position. Int Orthod 2013;11:303-13.
3. Solem RC, Marasco R, Guiterrez-Pulido L, Nielsen I, Kim SH, Nelson G. Three-dimensional soft-tissue and hard-tissue changes in the treatment of bimaxillary protrusion. Am J Orthod Dentofacial Orthop 2013;144:218-28.
4. Ackerman MB, Brensinger C, Landis JR. An evaluation of dynamic lip-tooth characteristics during speech and smile in adolescents. Angle Orthod 2004;74:43-50.

5. Sodagar A, Borujeni DG, Amini G. Prediction of soft tissue profile changes following orthodontic retraction of incisors in Iranian girls. World J Orthod 2010;11:262-8.
6. Hayashida H, Ioi H, Nakata S, Takahashi I, Counts AL. Effects of retraction of anterior teeth and initial soft tissue variables on lip changes in Japanese adults. Eur J Orthod 2011;33:419-26.
7. Hassan S, Shaikh A, Fida M. Effect of incisor inclination changes on cephalometric points A and B. J Ayub Med Coll Abbottabad 2015;27:268-73.
8. Al-Abdwani R, Moles DR, Noar JH. Change of incisor inclination effects on points A and B. Angle Orthod 2009;79:462-7.
9. Lee YJ, Park JT, Cha JY. Perioral soft tissue evaluation of skeletal Class II Division 1: A lateral cephalometric study. Am J Orthod Dentofacial Orthop 2015;148:405-13.
10. McNamara L, McNamara JA Jr., Ackerman MB, Baccetti T. Hard- and soft-tissue contributions to the esthetics of the posed smile in growing patients seeking orthodontic treatment. Am J Orthod Dentofacial Orthop 2008;133:491-9.
11. Molina-Berlanga N, Llopis-Perez J, Flores-Mir C, Puigdollers A. Lower incisor dentoalveolar compensation and symphysis dimensions among Class I and III malocclusion patients with different facial vertical skeletal patterns. Angle Orthod 2013;83:948-55.
12. Handelman CS. The anterior alveolus: Its importance in limiting orthodontic treatment and its influence on the occurrence of iatrogenic sequelae. Angle Orthod 1996;66:95-109.
13. Desai S, Upadhyay M, Nanda R. Dynamic smile analysis: Changes with age. Am J Orthod Dentofacial Orthop 2009;136:310.e1-10.
14. Singh B, Ahluwalia R, Verma D, Grewal SB, Goel R, Kumar PS. Perioral age-related changes in smile dynamics along the vertical plane: A videographic cross-sectional study. Angle Orthod 2013;83:468-75.
15. Van der Geld P, Oosterveld P, Kuijpers-Jagtman AM. Age-related changes of the dental aesthetic zone at rest and during spontaneous smiling and speech. Eur J Orthod 2008;30:366-73.
16. Sackstein M. Display of mandibular and maxillary anterior teeth during smiling and speech: Age and sex correlations. Int J Prosthodont 2008;21:149-51.
17. Chetan P, Tandon P, Singh GK, Nagar A, Prasad V, Chugh VK. Dynamics of a smile in different age groups. Angle Orthod 2013;83:90-6.
18. Sforza C, Dolci C, Gibelli DM, Codari M, Pucciarelli V, Ferrario VF, *et al.* Age-related and sex-related changes in the normal soft tissue profile of native Northern Sudanese subjects: A cross-sectional study. Br J Oral Maxillofac Surg 2016;54:192-7.
19. Roldán SI, Restrepo LG, Isaza JF, Vélez LG, Buschang PH. Are maximum bite forces of subjects 7 to 17 years of age related to malocclusion? Angle Orthod 2015. doi: http://dx.doi.org/10.2319/051315-323.1.[In Press].
20. Loster JE, Williams S, Wieczorek A, Loster BW. The Polish face in profile: A cephalometric baseline study. Head Face Med 2015;11:5.
21. Vela E, Taylor RW, Campbell PM, Buschang PH. Differences in craniofacial and dental characteristics of adolescent Mexican Americans and European Americans. Am J Orthod Dentofacial Orthop 2011;140:839-47.
22. Lahlou K, Bahoum A, Makhoukhi MB, Aalloula el H. Comparison of dentoalveolar protrusion values in Moroccans and other populations. Eur J Orthod 2010;32:430-4.
23. Beukes S, Dawjee SM, Hlongwa P. Soft tissue profile analysis in a sample of South African Blacks with bimaxillary protrusion. SADJ 2007;62:206, 208-10, 212.
24. Brock RA 2nd, Taylor RW, Buschang PH, Behrents RG. Ethnic differences in upper lip response to incisor retraction. Am J Orthod Dentofacial Orthop 2005;127:683-91.
25. Hernández-Sayago E, Espinar-Escalona E, Barrera-Mora JM, Ruiz-Navarro MB, Llamas-Carreras JM, Solano-Reina E. Lower incisor position in different malocclusions and facial patterns. Med Oral Patol Oral Cir Bucal 2013;18:e343-50.
26. Sullivan GM, Feinn R. Using effect size-or why the P value is not enough. J Grad Med Educ 2012;4:279-82.
27. Shamlan MA, Aldrees AM. Hard and soft tissue correlations in facial profiles: A canonical correlation study. Clin Cosmet Investig Dent 2015;7:9-15.

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