

The differences of the skeletal and dental heights between the two age groups of class I deep bite. (Cephalometric Study)

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ABSTRACT

Aims: The purpose of this study was to determine the age differences for deep bite malocclusion concerning facial skeletal and dentoalveolar height. **Materials and Methods:** It was carried out on a sample of (50) students (16 males and 34 females), aged (12–15) years with class I deep bite malocclusion present when the incisal edge of the lower central incisor is at least in contact with the gingival third of the upper central incisor in normal healthy individuals with full set of permanent teeth in both jaws. The sample were divided into two age groups (12–13) and (14–15) years old. Lateral cephalometric radiograph was taken for each subject. Twenty-one cephalometric measurements (nine angular and twelve linear) and five ratios had been determined. The data were statistically analysed using statistical package for social statistics. **Results:** The results revealed that upper anterior facial height, ramus height, total posterior facial height, lower posterior facial height, upper posterior dental height and lower anterior dental height were significantly increase with age in total sample. Males showed increase of total posterior facial height and lower posterior facial height with age while females showed increase of lower posterior facial height and upper posterior dental height with increasing age. Concerning ratios, total posterior facial height to total anterior facial height ratio was increased significantly with age in males opposite to the lower anterior facial height to total anterior facial height ratio which was decreased significantly with age in males. Upper posterior dental height to upper anterior dental height ratio showed significant increase with age in males, females and total sample. Angular measurements revealed that males, females and total sample showed significant decrease of the angle formed by the intersection between occlusal plane and palatal plane (Occ–pp) with increasing age. **Conclusions:** Deep bite was affected by age only for posterior skeletal facial dimensions and not for anterior skeletal facial measurements.

Key Words: facioskeletal heights, dentoalveolar heights, skeletal height ratios, dentoalveolar ratios, deep bite.

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INTRODUCTION

Deep bite is defined as an excessive vertical overlap of the incisor teeth when the molars and premolars are in maximum intercuspation.^(1,2)

The cases which have proved most difficult to treat and which have the least favorable prognosis are frequently those in which there is a vertical discrepancy that is manifested anteriorly either as a deep overbite or as an open bite.⁽³⁾

The vertical dimension consider as an important dimension to the clinical orthodontist and the vertical discrepancy may be explained as open and deep bites.⁽⁴⁾

The use of cephalometric measures that express the relations between craniofacial structure and occlusion is an accepted component of orthodontic diagnosis and orthognathic surgery.⁽⁵⁾

Malocclusion are to be considered largely as symptoms of a dysplastic facial development. Changes in the structure of the bite with advancing age also may be considered largely as symptomatic and indicative of a change in the proportion between the various parts of the facial skeleton.

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on and the base of the skull. The original deep bite cases exhibited a greater tendency to open than the normal overbite cases. In general, overbite decreased with age, the age changes being greater for overbite than for over jet.⁽⁶⁾ The aim of the current study is to determine the age differences for deep bite malocclusion concerning facioskeletal and dentoalveolar heights.

MATERIALS AND METHODS

The sample size of this study comprised (50) students, (16 males and 34 females). Their ages were ranged between 12–15 years old and were selected from examination of 4520 students in Mosul city.

1. Full set of permanent teeth in both jaws (excluding third molars).
2. Class I molar anterior deep bite malocclusion present when the incisal edge of the lower central incisor is at least in contact with the gingival third of the palatal surface of the upper central incisor (Figure 1). The pencil used for making the position of the maxillary incisal edge on the labial surface of the mandibular incisors, and then the distance was measured metrically, the upper central incisor should cover more than 60 % of the labial surface of the lower central incisor.
3. Normal healthy individuals with no gross facial deformity.
4. No history of orthodontic treatment or maxillofacial surgery or extensive dentistry.
5. All subjects were Iraqi in origin. Their parents were born in the center of Mosul city.

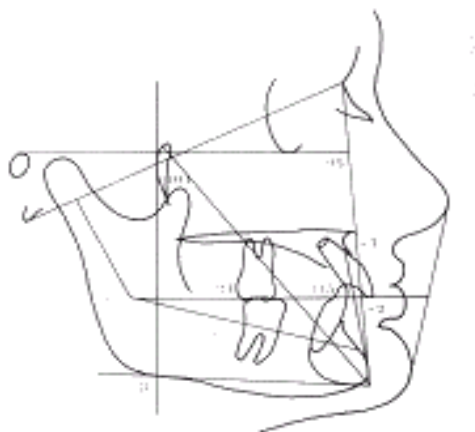


Figure (1): Deep bite malocclusion.

Each person was seated on ordinary chair, and was asked information about name, age, and origin. History of facial trauma, orthodontic treatment and medical history were taken. All subjects were clinically examined in their schools, then the selected students were re examined to selection check their fulfillment of the required sample.

Lateral cephalometric radiographs were taken for each subject at centric occlusion and the lips were in relaxed position. The head was fixed by two ear rods laterally and a plastic nasal stopper on the bridge of the nose anteriorly. The subjects were in standing position with the Frankfort horizontal parallel to the floor.

The measurements are illustrated in Figure (2 and 3) including; (TAFH) Total Anterior Facial Height (N–Me) which is the vertical distance from nasion to menton.^(7,8) (UAFH) Upper Anterior Facial Height (N–ANS) which is the vertical distance from nasion to anterior nasal spine.^(9, 10) (LAFH) lower Anterior Facial Height (ANS–Me) which is the vertical distance from anterior nasal spine to menton.^(11, 12) (TPFH) Total Posterior Facial Height (S–Go) which is the vertical distance from the center of sella turcica to gonion.⁽¹²⁾ (UPFH) Upper Posterior Facial Height which is the perpendicular line from point S to palatal plane and (LPFH) Lower Posterior Facial Height which is the perpendicular line from the point gonion to the palatal plane.⁽¹³⁾ (RH) Ramus Height (Ar–Go) which is the distance from point Ar to point Go.⁽¹⁴⁾ Overbite which was measured in millimeters as the distance between perpendicular lines projected into the nasion–menton line from the maxillary and mandibular incisal tips. UADH (Upper Anterior Dental Height) which is the perpendicular distance from upper incisal edge (UIE) projected at a right angle to the palatal plane and LADH (lower Anterior Dental Height) which is the perpendicular distance from lower incisal edge (LIE) projected at a right angle to the mandibular plane (MP).⁽¹²⁾ UPDH (Upper Posterior Dental Height) which is the perpendicular distance from the mesio–buccal cusps of the upper first molar to the palatal plane.⁽¹⁴⁾ LPDH (Lower Posterior Dental Height) which is the perpendicular distance from the mesiobuc-

cal cusp of the lower first molar to the mandibular plane.⁽¹⁵⁾ TPFH/TAFH which is the ratio between the total posterior facial height and total anterior facial height.⁽¹⁴⁾, while LAFH/TAFH is the ratio between The lower anterior facial height and total anterior facial height and UAFH/TAFH which is the ratio between the upper anterior facial height and total anterior facial height.⁽¹⁶⁾ UPDH/UADH is the ratio between the upper posterior dental height and upper anterior dental height and LPDH/LADH is the ratio between the lower posterior dental height and lower anterior dental height.⁽¹⁷⁾ SN-MP which represents the inclination of the mandible to the anterior cranial base.^(12,17) PP-MP (Palato Mandibular Plane Angle) which is the angle of inclination of the mandibular to the maxillary base.⁽¹⁴⁾ OP-MP Angle (Mandi-

bular Occlusal Angle) which is formed between occlusal and mandibular planes.⁽¹⁶⁾ SN-PP Angle which is the angle of palatal plane inclination in relation to anterior cranial base.⁽³⁾ Op-pp Angle is the angle which is formed by the intersection between occlusal plane and palatal plane, N.S.Ar (Saddle Angle) is the angle between the anterior and posterior cranial base, S.Ar.Go (Articular Angle) which is the angle between the posterior border of ramus and posteriolateral cranial base and Sum of Posterior Angles (Go+Ar+S) which is the summation of Gonial, Articular and Saddle angles.⁽⁷⁾ Ar.Go.Me (Gonial Angle) is the angle between the posterior border of the ramus (Ar-Go) and lower border of the mandible or mand-ibular plane (Go-Me).^(3, 12)

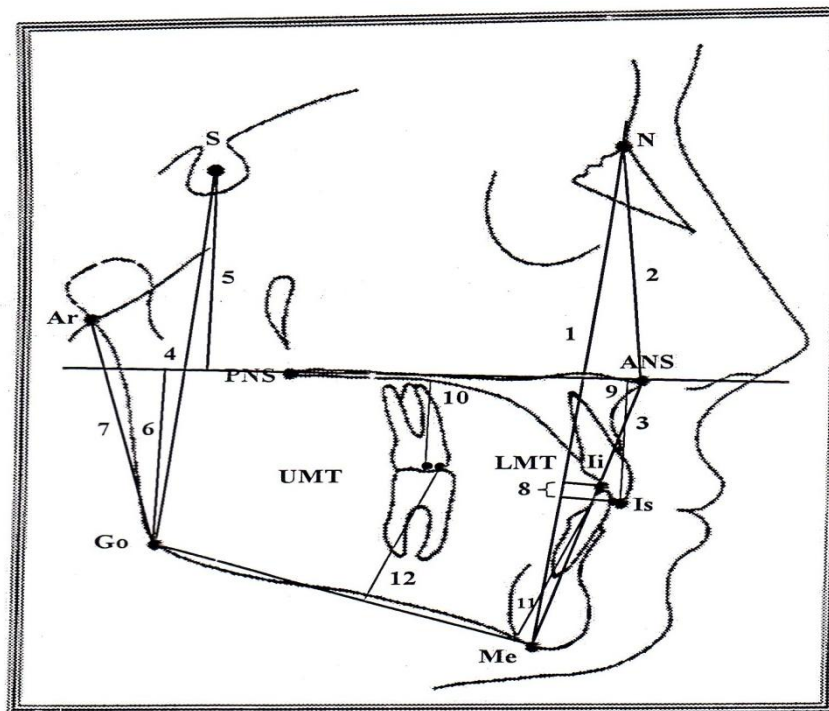


Figure (2) Skeletal and dental linear measurements. 1: TAFH; 2: UAFH; 3: LAFH; 4: TPFH; 5: UPFH; 6: LPFH; 7: RH; 8: Overbite; 9: UADH; 10: UPDH; 11: LADH; 12: LPDH

The samples were divided into two age groups 12-13 and 14-15 years old (males 12 - 13 years = 5, 14 - 15 years = 11 and females 12 - 13 years = 25, 14 - 15 years = 9). The data were analyzed by using SPSS program to obtain (minimum, maximum, means and standard deviations) for

total sample and both males and females in addition to the means and standard deviations for the two age groups. Comparison between the two age groups for whole measurements (linear, angular and ratios) were determined by using t-test at 0.05 level of significance.

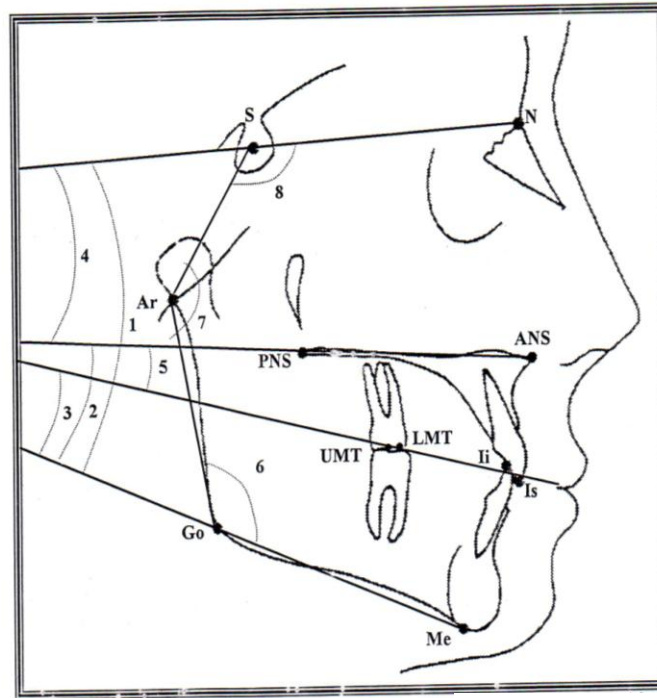


Figure (3): Angular measurements.⁽⁷⁾

RESULTS

Table (1) presents the minimum, maximum, means and standard deviations of overbite for males, females and total sample. Table(2) shows means and standard deviations for linear measurements (dental and skeletal) of the males, females and total sample with comparison between two age groups. Total sample were significantly increase with age in UAFH and RH variables. Males and total sample showed increase of TPFH with age in addition males, females and total sample also showed increase of LPFH with age. Females and total sample revealed increase of UPDH significantly with age, while LADH increased significantly with age in total sample only Table (3) indicates means and stand-

ard deviations for ratios of the males, females and total sample with comparison between two age groups TPFH/TAFH ratio increased significantly with age in males opposite to the LAFH/TAFH ratio which was decreased significantly with age in males. However, males, females and total sample showed significant increase with age concerning UPDH/ UADH ratio. Table (4) reveals means and standard deviations for angular measurements of the males, females and total sample with comparison between two age groups. Males showed significant decrease of PP-MP angle with age, in addition OP-PP angle showed significant decrease for males, females and total sample with increasing age

Table (1): Means and standard deviations of overbite for males, females and total sample

Sex	No.	Mean± SD	Minimum	Maximum	Age group	No.	Mean± SD
Males	16	6.125±0.93	5.0	8.0	12-13	5	5.800±1.03
					14-15	11	6.270±0.90
Females	34	5.647±1.04	4.5	8.5	12-13	25	5.420±0.80
					14-15	9	6.270±1.09
Total	50	5.8±1.00	4.5	8.5	12-13	30	5.483±0.90
					14-15	20	6.275±0.96

(measurement in millimeters); No: Numbers of samples; SD: Standard Deviation.

Table (2): Means and standard deviations for linear measurements (dental and skeletal) of the males, females and total sample with comparison between two age groups.

Variable	Sex	12-13		14-15		T-value	P-value
		Mean± SD	Mean± SD	Mean± SD	Mean± SD		
TAFH	M	125.4±7.08	127.45±5.66	-0.62	0.54		
	F	122.24±7.89	123.05±5.7	-0.27	0.78		
	T	122.76±7.80	125.47±5.97	-1.31	0.19		
UAFH	M	56.4±2.04	59.77±4.00	-1.75	0.10		
	F	56.66±3.50	57.83±2.00	-0.94	0.35		
	T	56.61±3.27	58.9±3.33	-2.39	0.02*		
LAFH	M	71.3±5.70	69.36±2.38	0.98	0.34		
	F	66.28±5.60	67.44±4.97	-0.54	0.58		
	T	67.11±5.84	68.5±3.79	-0.93	0.35		
TPFH	M	78.5±3.20	86.09±4.99	-3.09	0.008*		
	F	80.84±5.84	84.33±7.97	-1.39	0.17		
	T	80.45±5.51	85.3±6.37	-2.86	0.006*		
UPFH	M	45.4±2.43	46.54±2.85	-0.77	0.45		
	F	45.2±3.93	45.22±4.88	-0.01	0.98		
	T	45.23±3.69	45.95±3.84	-0.66	0.51		
LPFH	M	31.4±1.55	38.95±4.33	-3.73	0.002*		
	F	34.58±4.13	37.88±4.18	-2.05	0.048*		
	T	34.05±3.99	38.47±4.18	-3.76	0.000*		
RH	M	47.8±4.96	50.86±4.68	-1.19	0.25		
	F	47.2±4.13	49.66±6.01	-1.35	0.18		
	T	47.3±4.19	50.32±5.20	-2.26	0.028*		
UADH	M	32.4±3.97	30.54±2.29	1.19	0.25		
	F	28.86±3.39	29.5±3.03	-0.49	0.62		
	T	29.45±3.67	30.07±2.63	-0.65	0.51		
UPDH	M	22.8±1.78	23.72±1.48	-1.08	0.29		
	F	21.0±2.39	22.88±2.05	-2.09	0.04*		
	T	21.3±2.38	23.35±1.77	-3.28	0.002*		
LADH	M	44.7±3.03	45.09±2.15	-0.29	0.77		
	F	42.54±3.17	44.22±2.38	-1.44	0.15		
	T	42.9±3.20	44.7±2.24	-2.17	0.035*		
LPDH	M	32.4±2.19	33.31±1.75	-0.9	0.38		
	F	31.92±2.94	33.55±2.78	-1.44	0.15		
	T	32.00±2.81	33.42±2.21	-1.90	0.063		

Variables were measured in millimeters; M: Males; F: Females; T: Total; SD: Standard deviation. TAFH: Total Anterior Facial Height; UAFH: Upper Anterior Facial Height; LAFH: lower Anterior Facial Height; TPFH: Total Posterior Facial Height; LPFH: Lower Posterior Facial Height; (RH) Ramus Height; UADH: Upper Anterior Dental Height; LADH: lower Anterior Dental Height; UPDH: Upper Posterior Dental Height; LPDH: Lower Posterior Dental Height.

* Significant Difference

Table (3): Means and standard deviations for a ratios of the males, females and total sample with comparison between two age groups.

Variable	Sex	12-13	14-15	T-value	P-value
		Mean± SD	Mean± SD		
TPFH/TAFH	M	0.6268±3.63×10 ⁻²	0.6758±4.08×10 ⁻²	-2.29	0.038*
	F	0.6621±4.7×10 ⁻²	0.6858±6.5×10 ⁻²	-1.16	0.25
	T	0.6562±4.67×10 ⁻²	0.6803±5.19×10 ⁻²	-1.70	0.09
LAFH/TAFH	M	0.5647±1.48×10 ⁻²	0.5369±2.85×10 ⁻²	-2.22	0.043*
	F	0.5416±2.7×10 ⁻²	0.5471±1.94×10 ⁻²	-0.55	0.58
	T	0.5459±2.7×10 ⁻²	0.5415±2.47×10 ⁻²	-0.58	0.56
UAFH/TAFH	M	0.4498±1.93×10 ⁻²	0.4682±1.58×10 ⁻²	-2.01	0.064
	F	0.4638±2.33×10 ⁻²	0.47±1.86×10 ⁻²	-0.71	0.48
	T	0.4615±2.30×10 ⁻²	0.4690±1.66×10 ⁻²	-1.25	0.21
UPDH/UADH	M	0.7062±3.43×10 ⁻²	0.7784±5.08×10 ⁻²	-2.86	0.012*
	F	0.7297±5.41×10 ⁻²	0.7796±7.86×10 ⁻²	-2.09	0.044*
	T	0.7258±5.16×10 ⁻²	0.7789±6.29×10 ⁻²	-3.26	0.002*
LPDH/LADH	M	0.7246±1.30×10 ⁻²	0.7390±3.25×10 ⁻²	-0.94	0.36
	F	0.750±4.35×10 ⁻²	0.758±3.7×10 ⁻²	-0.49	0.62
	T	0.7458±4.10×10 ⁻²	0.7475±3.5×10 ⁻²	-0.15	0.87

M: Male; F: Female; T: Total; SD: Standard deviation. TAFH: Total Anterior Facial Height; UAFH: Upper Anterior Facial Height; LAFH: lower Anterior Facial Height; TPFH: Total Posterior Facial Height; LPFH: Lower Posterior Facial Height; (RH) Ramus Height; UADH: Upper Anterior Dental Height; LADH: lower Anterior Dental Height; UPDH: Upper Posterior Dental Height; LPDH: Lower Posterior Dental Height.

* Significant Difference.

Table (4): Means and standard deviations for angular measurements (dental and skeletal) of the males , females and total sample with comparison between two age groups.

Variable	Sex	12-13	14-15	T-value	P-value
		Mean± SD	Mean ± SD		
SN-MP	M	37.5±5.85	32.68±6.6	1.39	0.18
	F	31.92±5.45	30.33±6.48	0.71	0.48
	T	32.85±5.81	31.62±6.48	0.69	0.48
PP-MP	M	28.7±4.05	22.22±4.2	2.88	0.012*
	F	22.76±4.32	20.33±4.21	1.45	0.15
	T	23.75±4.77	21.37±4.2	1.8	0.078
OP-MP	M	17.8±2.04	16.04±4.25	0.86	0.4
	F	14.92± 3.86	15.00±4.76	-0.05	0.96
	T	15.4±3.75	15.57±4.4	-0.15	0.88
SN-PP	M	8.9±2.3	10.04±2.95	-0.76	0.45
	F	9.24±3.02	10±±3.64	-0.61	0.54
	T	9.18±2.88	10.02±3.18	-0.97	0.33
OP-PP	M	10.8±3.42	6.22±2.31	3.16	0.007*
	F	7.88±3	5±4.76	2.09	0.044*
	T	8.36±3.21	5.67±3.57	2.77	0.008*
Ar.Go.Me Angle	M	125.4±3.64	123.4±5.94	0.68	0.5
	F	122.52±6.75	119±8.3	1.26	0.21
	T	123±6.38	121.42±7.26	0.8	0.42
S.Ar.Go Angle	M	146.8±6.14	145.45±6.57	0.38	0.7
	F	146.64±7.66	146.72±5.66	-0.02	0.97
	T	146.66±7.33	146.02±6.05	0.32	0.74
N.S.Ar Angle	M	126.6±6.10	124.18±4.35	0.91	0.37
	F	124.4±6.46	126.22±6.33	-0.72	0.47
	T	124.76±6.36	125.1±5.29	-0.19	0.84
Go +	M	398.8±6.09	393.04±4.9	2.02	0.062
Ar +	F	393.56±5.36	391.94±8.04	0.67	0.5
S	T	394.43±5.73	392.55±6.33	1.09	0.28

Variables were measured in degrees; M: Males; F: Females; T: Total; SD: Standard deviation; SN-MP: Inclination of the mandible to the anterior cranial base; PP-MP: Palato Mandibular Plane Angle; OP-MP: Mandibular Occlusal Angle; SN-PP: Palatal plane inclination in relation to anterior cranial base; Op-pp: Intersection between occlusal plane and palatal plane; N.S.Ar: Saddle Angle; S.Ar.Go: Articular Angle; Go+Ar+S: Summation of Gonial, Articular and Saddle angles; Ar.Go.Me: Gonial Angle; *Significant Difference.

Discussion

The results were indicated that total sample was significantly increase with age in UAFH and RH variables, this comes in agreement with Richardson^(18,19) and Nanda⁽²⁰⁾ concerning RH which means that RH in deep bite group affected by age, but it is in contrast with Wylie⁽²¹⁾ who showed that RH is not affected by age and no significant differences were shown between Americans age groups. Males and total sample showed increase of TPFH with age which comes in agreement with Nanda⁽²⁰⁾ in ma-

les, females and total sample. In addition the LPFH was significantly increased with age in males, females and total sample. UAFH was significantly increased in total sample in the this study like Nanda⁽²⁰⁾ but his finding was not significant. This study showed that TAFH and LAFH were not significantly increase with age for males, females and total sample which comes in agreement with wylie⁽²¹⁾, but Richardson^(18,19) and Nanda⁽²⁰⁾ showed that these measurements were significantly increase with age for both genders. We can conclude

that deep bite was affected by age only for posterior skeletal facial dimensions and not for anterior skeletal facial measurements.

UPDH in females and total sample and LADH in total sample were increase significantly with age in which they were affected by growth but it was in contrast with Richardson⁽⁸⁾ who showed that there were no significant age changes at this period of time.

TPFH/TAFH ratio was increase significantly with age, while LAFH/TAFH ratio was decrease with age in males this comes in agreement with Viazis⁽²²⁾ for TPFH/TAFH ratio. UPDH/UADH ratio shows significant increase with age in males, females and total sample which means that this ratio is more prone to be affected by growth.

Males showed significant decrease of PP–MP angle with age which comes in agreement with Nanda⁽²³⁾ in addition OP–PP angle showed significant decrease for males, females and total sample with increasing age which comes in agreement with Nanda⁽²³⁾ for both genders. SN–PP angle showed slight increase while SN–MP and Ar.Go.Me angles showed slight decrease with age which comes in agreement with Nanda⁽²³⁾ and Kim⁽²⁴⁾.

CONCLUSION

Differences between the mean values of dentoskeletal measurements for corresponding two age groups were noticed. In total sample, UAFH, RH, TPFH, LPFH, UPDH and LADH were significantly increased with age. Males showed increase of TPFH and LPFH with age while females showed increase of LPFH and UPDH with increasing age. TPFH/TAFH ratio was increase significantly opposite to the LAFH/TAFH ratio which was decreased significantly with age in males. In addition males showed significant decreased of PP–MP angle with age. UPDH/ UADH ratio was significantly increase with age in males, females and total sample. Males, females and total sample showed significant decrease of OP–PP angle with increasing age.

It may be concluded that deep bite malocclusion are affected by age only for posterior dental and skeletal facial dimensions

and not for anterior skeletal facial measurements.

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