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Appraising Lower Incisor to Mandibular Plane Angle in Different Facial and Sympheal Morphology

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Abstract

Background: In orthodontic diagnosis and treatment planning assessment of an individual's facial skeletal pattern in vertical, sagittal and transverse direction is prevalent. Dental compensation is the reverse of skeletal disharmony.
Objectives: This study has correlated the position of mandibular incisors inclination with different facial types and with the mandibular symphyseal morphology.
Materials and Methods: The sample consisted of 100 Pakistani patients of two different age groups i.e. adolescents up to 12 years and audlts up to 22 years on which R–angle, Li–MP, B–MP, Li–MP, symphyseal width (W) and depth (D) were measured.
Results: No correlation was found between Li–MP and R–angle, B–MP, Li–MP, and W except with the D i.e. symphyseal depth.
Conclusions: No significant association observed between lower incisor inclination, different facial types, and symphyseal morphology except with the depth of the symphysis. Slight correlation of differential jaw growth and dental changes with age are coincidental events with no relationship.

Keywords: Lower Incisor Inclination, R-Angle, Symphyseal Morphology

1. Background

It is observable that the changes with growth and that facial growth continue throughout a person's life. In orthodontic diagnosis and treatment planning assessment of an individual's facial skeletal pattern in vertical, sagittal and transverse direction is prevalent. Numerous angular and linear measurements of different researchers have been derived to categories the patients with vertical skeletal discrepancies. Many of them are existing with shortcomings. Dental compensation is the reverse of skeletal disharmony. Dento-alveolar compensations are spontaneous changes in incisor position and inclination trying to attain a good occlusion anteriorly and an acceptable anterior guidance in cases of sagittal and to some extent, of vertical skeletal discordant. Changes in the inclination of the lower incisors to compensate for the skeletal discrepancy might cause surface remodeling of mandibular symphysis, affecting its morphology (1). Symphyseal shape and size can be affected by factors such as genetic and ethnicity, inclination of the lower incisors and facial type. Therefore, in this study we have correlated the lower incisor inclination, facial type, and mandibular symphyseal morphology to evaluate any reciprocity between them. The stability of orthodontic treatment results can be bettered if the orthodontist respects the morphology and functional characteristics of each individual.

2. Objectives

This study has correlated the position of mandibular incisors inclination with different facial types and with the mandibular symphyseal morphology.

3. Materials and Methods

The study conducted at orthodontics department of Dow international dental college Ojha campus. 100 pretreatment lateral cephalograms of 25 male adolescents, 25 adult males, 25 female adolescents and of 25 adult women were evaluated by using four angular measurements. i.e. maxillary-mandibular plane angle, gonial angle, lower incisor to mandibular plane angle and R angle along with four linear symphyseal measurements i.e. symphyseal depth and width, perpendicular distances between lower incisor–mandibular plane and point B–mandibular plane as shown in the Table 1 and Figure 1 All tracings were performed by a single researcher. Patients with gross facial dysplasias due to any cause presence of any supplemental, missing, or malformed tooth, anterior and or posterior crossbites and with periodontal disease were in excluded criteria.

4. Results

Data were entered and evaluated on SPSS 16. Mean and standard deviations of the parameters analyzed are given in Table 2. (Descriptive Statistics).

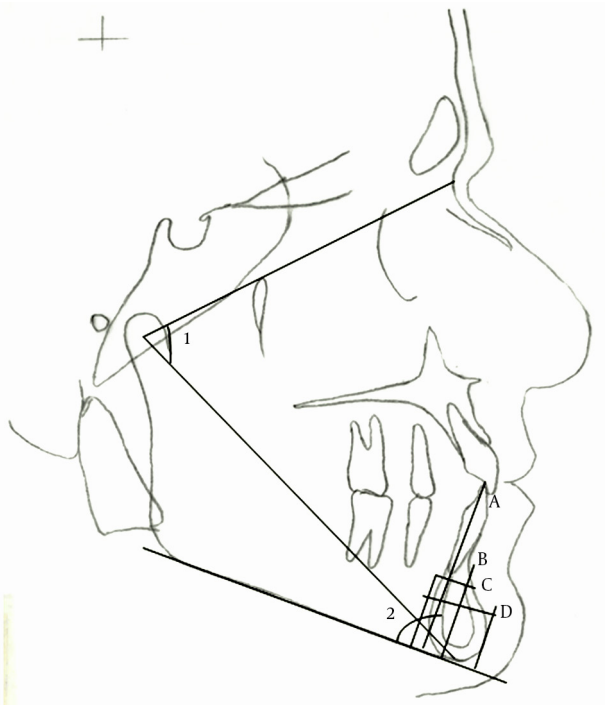
Spearman ranks correlation analysis was performed on data to see the relationship of R, IMPA, H1, H2, W and D with Age group and gender. Correlation matrix shows that, age group has positive significant association with H1 (r = 0.48, P = 0.00), H2 (r = 0.46, P = 0.00), and W (r = 0.39, P = 0.00), but negatively associated with gonial angle (r = - 0.30, P = 0.002). Gender has negative significant correlation with R (r = - 0.21, P = 0.028), H1 (r = - 0.29, P = 0.003), H2 (r= -0.38, P = 0.00) and W (r = -0.31, P = 0.02). It was found that IMPA is statistically significantly but negatively correlated with the vertical pattern of the patient i.e. R-angle, Table 3 (Spearman's correlation values with Ll-MP).

The correlation analysis revealed highly significant age dependency for all absolute symphyseal measurements, Table 4 (Spearman's Correlation values with age).

Table 1. Angular and Linear Parameters

Variables	Description
R-angle	Anterior angle between CO-N axis and CO-Me axis
Ll-MP	Incisor to mandibular plane angle (IMPA)
H1	Perpendicular distance between point B to mandibular plane
H2	Perpendicular distance between lower incisor edge to mandibular plane
D	Symphyseal depth between point B and posterior tangent to symphysis
W	Symphyseal width between anterior and posterior tangent to symphysis

Figure 1. Parameters Delineated



1, R angle; 2, LI–MP (IMPA); a,H2; b, H1; c, D; d, W

Table 2. Descriptive Statistics

	12 Years Male		22 Years Male		12 Years Female		22 Years Female	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
LI-MP	94.84	9.45	95.44	6.87	96.12	8.50	97.36	7.97
R-angle	74.08	5.12	74.12	3.45	72.24	5.04	72.44	5.29
B–MP (H1)	20.08	2.37	23.28	2.37	18.92	2.21	21.24	2.55
Li–MP (H2)	40.04	3.34	45.60	3.00	38.28	3.02	40.48	3.56
Symphyseal width (W)	15.32	1.45	17.36	1.82	14.46	2.14	15.56	1.60
Symphyseal depth (D)	8.80	1.86	9.60	1.47	8.48	1.31	8.96	1.54

Table 3. Spearman's Correlation Values With Ll-MP

	Age	Gender	R <	H1	H2	W	D
Incisor mandibular plane angle	0.042	0.112	-0.169	0.138	0.042	0.101	0.231[a]
Correlation coefficient sign.	0.678	0.265	0.092	0.172	0.682	0.316	0.021
N	100	100	100	100	100	100	100

[a]Correlation is significant at the 0.01 level (2 tailed).

Table 4. Spearman's Correlation Values With Age[a]

Age Correlation Coefficient Sign	H1	H2	W	D
	0.482	0.462	0.394	0.190
	0.000	0.000	0.059	0.000
N	100	100	100	100

[a]Correlation is significant at the 0.01 level (2 tailed).

5. Discussion

In this study, we have used maxillary-mandibular plane angle (MMA) and a new parameter R-angle to assess vertical skeletal disharmony. In general, mandibular incisors play a more important role in compensations than maxillary incisors. For different vertical or anteroposterior relations of the apical bases, nature provides different compensatory inclinations of maxillary and mandibular incisors to ensure occlusion harmony. Lower Incisor Inclination can be determined through cephalometrics calculated as IMPA 90 + 5 degree, R angle below 70.50 indicate Low angle cases, between 70.5 - 75.50 indicate average angle cases and above 75.50 indicate high angle cases (2). This study showed mean values of LI–MP at 12 years, 95.48 degree and at 22 years 96.4 degree, that shows slight increase in incisors inclination with age while mean values of LI–MP in males 95.1 degree and in females 96.7 degree which shows higher inclinations in females. R-angle showed no significant difference of mean values between gender and different age groups, overall mean value calculated was 73 + 2 degree. Mandibular symphysis serves as a reference anatomical landmark for esthetics and beauty of the face in general and of the lower part in particular (3, 4). As the lower face height increases, upper and lower anterior teeth may continue their eruption in an attempt to maintain a positive overbite, bringing their alveolar bony support with them, resulting in an increase in total symphyseal length. (3, 5, 6). In this study for H1, D and W, an age-depended slight increase can be observed for both sexes with an increase can be detected for H2, more pronounced in males. Several other studies (7-9) supports these obtained results.

5.1. Conclusion

No significant association observed between lower incisor inclination, different facial types, and symphyseal morphology except with the depth of the symphysis. Slight correlation of differential jaw growth and dental changes with age are coincidental events with no relationship.

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