Evaluation and Correlation of Facial form, Arch Form, Skeletal Malocclusion and type of growth pattern In Nalgonda Population.

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ABSTRACT

Background: Aim: To find out the association, if any, between the facial forms, dental arch forms, skeletal malocclusion and type of growth pattern in a sample of population in Nalgonda seeking orthodontic treatment. **Methods:** After obtaining Ethical committee clearance, three hundred case records from the department archives were analyzed for the present study. Standardized frontal photographs for the face were analyzed to determine the facial form. Mandibular dental casts were obtained to classify the dental arch forms. Cephalometric values ANB and Gonion Gnathion to Sella Nasion plane (Go-Gn to SN Plane) were analyzed to evaluate skeletal type of malocclusion and type of growth pattern respectively. Statistical analysis in the form of Frequencies and the association between the study parameters were determined by Pearson's Chi square test. **Results and Conclusions:** There was no significant association between the facial and dental arch forms except in females between the arch forms, facial forms, skeletal patterns by ANB angle and growth pattern by GoGn-SN.

Keywords: Arch Forms, Skeletal Malocclusion, Facial Forms.

INTRODUCTION

The achievement of a stable, functional and esthetic arch form has long been one of the prime objectives of orthodontics. A key aspect in the achievement of this goal is the identification of a suitable arch form to use in the treatment of each case.[1] The patient's pretreatment arch form is the best guide to future arch form and stability. Arch form tends to return to its pretreatment shape after retention. The greater the treatment change, the greater is the tendency for post retention change.[2]

Appraisal of the facial types or forms is a vital aspect in orthodontic diagnosis, treatment planning and prognosis. Many factors play role in establishing the facial morphology like the shape of pharyngeal air space,[3] anatomy of masticatory muscles the anatomy of dento-alveolar complex and the types of occlusion.[4-8] The craniofacial complex growth direction is determined by the facial types and this is important in choosing the type of biomechanics used to treat orthodontic cases.[9-11]

The facial index is a term used to express the facial proportions. It can be determined by many methods. Firstly, by dividing the facial height (measured from

Nasion to Gnathion) by the bizygomatic width (measured from the right to the left Zygion). The other method is by calculating the ratio of the bizygomatic width to the anterior face height. The word Prospon in Greek means face.[12] Either method can be used to describe the facial types as euryprosopic, mesoprosopic and leptoprosopic.[13]

Skeletal analysis of malocclusion by calculating ANB angle gives interpretation of the antero-posterior positioning of maxilla and mandible and Go-Gn to SN values interprets the pattern of growth as these values has in Indian population not been studied extensively. Hence, to find out the association, if any, between the facial forms, dental arch forms, skeletal, malocclusion and type of growth pattern in a sample was attempted in this current study.

MATERIALS & METHODS

"Ethical approval for this study was provided by the Institutional Ethical Committee of Kamineni Institute of Dental Sciences (No: KIDS/IEC/ORTHP/2017-18/2) on 10-08-2017. The sample consisted of 300 randomly selected case records of Department of Orthodontics and Dentofacial Orthopedics, Kamineni Institute of Dental Sciences, Narketpally, Nalgonda. Among these 300 selected patients, 180 were females and 120 were males. The age range of the selected patients was between 18 and 25 years.

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The arch forms thus obtained were classified into square, ovoid or tapered according to arch form templates given by 3M Unitek. Such type of arch form templates was also used by Nojima et al,[5] and Kook et al,[6] in previous studies. The facial form was analyzed from the frontal pretreatment photograph of the patients' records selected. ANB angle and GoGn-Sn angle were calculated by lateral cephalograms present in the records of the selected patients.

Statistical Analysis

The data were analyzed using SPSS program (version 21). The statistical analyses included the descriptive analysis (frequencies and percentages) and inferential statistics in the form of Pearson's Chi Square.

RESULTS

[Table 1] shows the frequency distribution of arch forms according to gender out of 180 females 116 females had ovoid arch forms (64%), 45 (25%)females had tapered arch forms and 19 (10.5%) females had square arch forms, whereas out of 120 males 86 males (71.6%) had ovoid arch forms 23 (19.1%) males had tapered arch forms and 11 males (9%) had square arch forms.

Table 1: Frequency distribution of arch forms according to gender

	Arch Form							Total
		Ovoid	Percentage	Square	Percentage	Tapered	Percentage	
SEX Total	Female	116	64%	19	10.5%	45	25%	180
	Male	86	71.6%	11	9%	23	19.1%	120
Total		202		30		68		300

Table 2: frequency distribution of facial forms according to gender.

	Facial Form							Total
		EURY	Percentage	LEPTO	Percentage	MESO	Percentage	
SEX Total	Female	13	7%	12	6%	155	86%	180
	Male	8	6%	12	10%	100	83.3%	120
Total		21		24		255		300

‡: Eury- Euryprosopic, Lepto- Leptoprosopic, Meso-Mesoprosopic.

Table 3: Frequency distribution of ANB angle according to gender.

	Skeletal Class							Total
		CL1	Percentage	CL2	Percentage	CL3	Percentage	
SEX Total	Female	72	40%	93	51.6%	15	8%	180
	Male	55	41%	57	47.5%	8	6%	120
Total		127		150		23		300

‡: CL1- Class I, CL2-Class II, CL3- Class III

Table 4: Frequency distribution of growth pattern according to gender.

		Growth Pattern						
		HA	Percentage	LA	Percentage	NO	Percentage	Total
SEX	Female	55	30.5%	106	58%	19	10.5%	180
	Male	39	32.5%	64	53%	19	15.8%	120
Total		94		170		36		300

‡: HA-High angle, LA- Low Angle.

Table 5: correlations of facial form, arch form, ANB, growth pattern and gender

		Arch Form	ANB	FACIAL FORM	GOGN	SEX
ARCH	Pearson Correlation	.010	.010	.091	.011	.072
	Sig. (2-tailed)		.863	.118	.847	.214
	N	300	300	300	300	300
ANB	Pearson Correlation	.010	1	.015	.054	-.015
	Sig. (2-tailed)	.863		.798	.349	.801
	N	299	299	299	299	299
FACE	Pearson Correlation	.091	.015	1	-.085	-.051
	Sig. (2-tailed)	.118	.798		.143	.384
	N	300	300	300	300	300
GOGN	Pearson Correlation	.011	.054	-.085	1	-.062
	Sig. (2-tailed)	.047	.349	.143		.283
	N	300	300	300	300	300
SEX	Pearson Correlation	.072	-.015	-.051	-.062	1
	Sig. (2-tailed)	.214	.801	.384	.283	
	N	300	300	300	300	300

[Table 2] shows frequency distribution of facial forms according to gender 150 (86%) females had mesoprospic face form, 13 (7%) females had euryprosopic and 12 females (7%) had leptoprosopic facial forms, whereas out of 120 males 100 (83.3&) males had mesprosopic facial form and 8 and 10% of europrosopic and leptoprosopic facial forms

[Table 3] shows frequency distribution of ANB angle according to gender out of 180 females 72 (40%) had class I skeletal pattern and 93(51.6%) had class II and 15(8%) females had class III skeletal pattern and out of 120 males 55 males (41%) had class I skeletal pattern and 57(47.5%) had class II skeletal pattern and 8(6%) class III skeletal pattern.

[Table 4] shows frequency distribution of growth pattern according to gender in which out of 180 females 106(58%) females had low angle growth pattern and 55(30.5%) females had high angle growth pattern and 19(10.5%) females had normal growth pattern where as in males out of 120 males 64 males had low angle growth and 39(32.5%) had high angle and 19(15.8%) had normal growth pattern.

[Table 5] shows the correlations of facial form, arch form, ANB, growth pattern and gender.
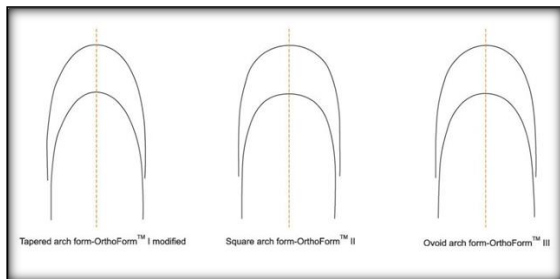

Figure 1: Arch Forms templates

DISCUSSION

Arch forms were first classified as square, ovoid and tapered by Chuck in 1932.[14] Numerous investigators and clinicians have used this classification over the years, and eventually orthodontic manufacturers began producing arch forms based on this classification. Such a three arch form approach allows for greater individualization than the single arch form approach, especially in the early arch wire stages.

Kook et al compared arch forms in Korean and North American white samples. The Korean sample showed 18% square arch forms, 38% ovoid arch forms and 44% tapered arch forms. On the other hand, North American white sample showed 47% square arch forms, 34% ovoid arch forms and 18% tapered arch forms.[15]

Khatri et al,[16] the sample of patients seeking orthodontic treatment for Aurangabad population showed 32.5% arches of tapered form, 50% arches of ovoid form and 17.5% arches of square form. So, there was increased frequency of ovoid arch forms than tapered and square arch forms.

However, in the present study 67.3% arches were of ovoid form and 22.7% arches of tapered form and 10.0% arches of square form which were similar to the study done by Khatri et al as it was done in a particular type of Indian population but different from the study done by Kook et al this may be because of the changes in the geographical region of the population.

ANB angle by Steiner's is a good cephalometric parameter to identify the skeletal pattern in an individual and in population. Duran et al,[17] conducted a study in Turkish males and found it to be inconsistent and compared it with appraisal, in the present study out of 180 females 72 (40%) had class I skeletal pattern and 93(51.6%) had class II and 15(8%) females had class III skeletal pattern and out of 120 males 55 males (41%) had class I skeletal pattern and 57(47.5%) had class II skeletal pattern and 8(6%) class III skeletal pattern.

Evaluation of the facial form has important effect on the treatment planning because it may exaggerate or alleviate the treatment outcomes and may interfere with final esthetic and stability of treatment, Nahidh et al,[18] conducted a study in the population of Baghdad in which he evaluated the facial forms and arch forms and its correlation he found that euryprosopic is most common facial form in population of Baghdad but in our study we found that 150 (86%) females had mesoprospic face form, 13 (7%) females had euryprosopic and 12 females (7%) had leptoprosopic facial forms, whereas out of 120 males 100 (83.3&)males had mesprosopic facial form and 8 and 10% of europrosopic and leptoprosopic facial forms, Hence mesoprospic facial form is more common in Nalgonda population, this may be due to different geographical condition.

Evaluation of growth pattern by cephalometric parameter of GoGN-SN is not be reported extensively and hence we have calculated it for analyzing the growth pattern in Nalgonda population and found out that out of 180 females 106(58%) females had low angle growth pattern and 55(30.5%) females had high angle growth pattern and 19(10.5%) females had normal growth pattern where as in males out of 120 males 64 males had low angle growth pattern and 39(32.5%) had high angle, 19(15.8%) had normal growth pattern.

The results revealed non-significant associations between the facial and dental arches forms except in females when a high significant association was reported between any of the parameters.

CONCLUSION

There was no significant association between the facial and dental arch forms except in females between the arch forms, facial forms, skeletal patterns by ANB angle and growth pattern by GoGn-SN

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