Original Article

THE RELATION OF VERTICAL FACIAL PATTERN WITH SAGITTAL CRANIOFACIAL DIMENSIONS — A STUDY

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ABSTRACT

Objectives: *The aims of this study were to assess the relation of sagittal and vertical facial dimensions in lateral cephalometric analysis and occurrence of hyperdivergency in various facial profiles.*

Material and Methods: *This study was conducted on 200 patients in the Department of Orthodontics Khyber College of Dentistry Sagittal analysis was done by measuring ANB angle, and vertical relation was determined by MMA angle and Lower Face height ratio.*

Results: *Ninety eight patients were skeletal class I (49%) followed by 92 patients (46%) in skeletal class II. Forty eight percent patients were normodivergent followed by 37% hyperdivergent facial profile. Fifty one patients (52.04%) of skeletal class I patients were normo divergent and 43 patients (46.73%) of skeletal class II patients were hyperdivergent.*

Conclusion: *Most of normodivergent patients were skeletal class I and hyperdivergent were class II.*

Key Words: *Sagittal and vertical facial dimensions, Lateral cephalometric analysis, Hyperdivergent.*

INTRODUCTION

The field of orthodontics is in pursuit to recognize different facial forms.[1,2] The pursuit of beauty concealed in the face takes orthodontic diagnosis to a whole new level and highlights the daily exercise of orthodontists, who analyze the face to establish such diagnosis.[3,4] Current concepts in diagnosis and treatment planning focus on the balance and harmony of various facial features. Dentofacial skeletal anomalies generally occur as a result of a differential in growth of the upper facial skeleton to the lower facial skeleton, resulting in discrepancy of the normal relationship that exists between the upper and lower jaw. Underlying genetic predisposition and acquired causes can influence the normal growth of the facial skeleton.[4,5] Interactions between severity of initial anteroposterior and vertical dysplasia account for severe skeletal, soft tissue and dental anomalies.[6,7] The sagittal and vertical changes that occur during growing period endup in various malocclusions. Dental compensations are often present for various skeletal discrepancies.[4,7] The disparity is so prominent that it is recognized clinically.[7] The sagittal discrepancy is manifested as skeletal class I, II and III malocclusion. Vertical discrepancy is normo, hypo or hyperdivergent profiles. Skeletal class I manifests with harmonious skeletal but dental malrelationship.[8] Most of skeletal class III malocclusion were originally thought to arise primarily from an overdevelopment of mandible, underdevelopment of maxillary and resultant hypodivergent profiles.[9,10] Skeletal class II were exhibiting a short ramus, obtuse gonial angle,[11] increased mandibular plane angle, both relative to the cranial base and the palatal plane, so diagnosed as long face syndrome.[12,13] This study will serve as a stand point to the researchers, in assessing the relation of sagittal and vertical facial dimensions in lateral cephalometric analysis and occurrence of hyperdivergency in various facial profiles in a section of the population of Khyber Pakhtunkhwa.

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MATERIAL AND METHODS

This study was conducted at the Department of Orthodontic, Khyber College of Dentistry,

Peshawar for a period of one year. Two hundred out patient data was selected, reporting to the Department of Orthodontics Khyber College of Dentistry in year 2010. Patients with full complement of healthy teeth were included in this study. Syndromic patients and patients with history of previous orthodontic or orthopedic treatment, trauma and surgery were excluded from this study.

Age, gender and cephalometric analysis were recorded on specially designed Performa. Skeletal analysis for Sagittal relation was done by measuring ANB angle to determine skeletal class I (ANB 2±2), class II (ANB>4) and Class III (ANB<1). Vertical analysis was done by measuring Maxillary Mandibular Angle (MMA) and Lower Facial Height (LFH), to determine the facial types as normodivergent (MMA25±4, LFH 54±2%), hyperdivergent (MMA>30%, LFH>57%), and hypodivergent (MMA<20, LFH<50%). Measurements were recorded, tabulated and statistically analyzed employing the tracings of the lateral cephalograms. The frequency of normodivergent, hyperdivergent, hypodivergent and skeletal class I, II, III were determined. Cross tabulation of sagittal and vertical measurement was done to determine the relation between them.

RESULTS

Two hundred patients were recruited in this study at the Orthodontic Department, Khyber College of Dentistry, Peshawar for determination of relationship between sagittal and vertical facial dimensions and frequency of long face syndrome (hyperdivergency) in various skeletal anomalies. Among 200 patients, 100 patients (50%) were male and 100 patients (50%) were female with male to female ratio of 1:1. The age range was 10-40 years with mean age of 14±5 years. One hundred and fifty four patients (77%) reported at the age of 10-20 years followed by 42 patients (21%) at 21-30 years. The details of age distribution are given in Table 1.

Table 1: Age Distribution

Age in years	Male	Female	Total
11-20	77	77	154
21-30	23	19	42
31-40	0	4	4
Total	100	100	200

Table 3: Vertical Facial Pattern of patients

Vertical Analysis (Facial Profiles)	n	Percentage
Normodivergent	96	48
Hyperdivergent	74	37
Hypodivergent	30	15
Total	200	100

Ninety eight patients (49%) were skeletal class I followed by 92 patients (46%) in skeletal class II. Only 10 patients (5%) were found in skeletal class III as shown in Table 2. Table 3 shows the detail distribution of vertical pattern of 200 patients, out of these 48% were normo divergent followed by 37% hyperdivergent facial profile. Table 4 Shows cross tabulation of sagittal (skeletal profiles) and vertical (facial profiles) correlation. Fifty one patients (52.04%) of skeletal class I patients were normodivergent and 43 patients (46.73%) of skeletal class II patients were hyperdivergent.

DISCUSSION

The quantitative assessment of the divergence of facial size and shape from an established norm should always be the first step in orthodontic diagnosis and treatment.[6,7] Hyperdivergency is common finding in majority of skeletal and Angle class II malocclusion.[14, 15] Results of this study are similar to that found in other surveys of orthodontic patients in

Table 2: Profile Distribution in various age groups

Sagittal Analysis	11-20 Years		21-30 years		31-40 years		Total
	n	%age	n	%age	n	%age	
Skeletal Class I	75	48.70	21	50	2	50	98
Skeletal Class II	72	46.75	19	45	1	25	92
Skeletal Class III	70	4.54	2	4.77	1	25	10
Total	154		42		4		200

Table 4: Cross Tabulation of Vertical and Sagittal relation

Sagittal Analysis	Class I		Class II		Class III		Total
	n	%age	n	%age	n	%age	
Normodivergent	51	52.04	40	43.47	5	25	98
Hyperdivergent	28	28.57	43	46.73	3	22	92
Hypodivergent	19	19.38	9	20.93	2	20	0
Total	98		92		10		200

terms of gender distribution and prevalence of hyperdivregent facial types in skeletal class I, II, and III malocclusion.[16,17,18] The result among 200 patients showed that the most prevalent age group for the presentation of skeletal class II and hyperdivergent facial type was during the second decade of life n=72 (78%) and n=59 (79%) patients respectively. Similarly, Ijaz[19] reported Angle's Class II Div 1, skeletal Class II and hyperdivergent facial profiles were the most common pattern of malocclusion during second decade of life. Hameed[20] reported that skeletal Class II and hyperdivergent pattern of facial profiles presented at 10-20 years age. On the contrary, the local studies by Shehzad et al[21] and Afzal et al[22] reported skeletal Class I and normo divergent profiles as the most frequent pattern during second decade of life. This study also agreed with this finding as most of the patients were normo divergent and were skeletal class I. The above difference might be due to population group selected from dental OPD patients as opposed to orthodontic OPD patients in other studies. International literature[23,24] reported skeletal Class II with angle class 2 div I malocclusion as more frequent than skeletal Class I and skeletal III during second decade of life in Asian males. This study showed that most of the patients were skeletal class I followed by skeletal class II and class III i.e., 49%, 46% and 5% respectively. Research of Proffit et al[25] showed, higher incidence of skeletal Class I i.e., 52.2%, only 42.4% Class II and less than 5% skeletal Class III. Another study in Nigeria[23] showed the skeletal relationships as: skeletal Class I 76.5%, Class II 15.5% and Class III 8.0%.

The results of the study showed that most patients had normo divergent profiles followed by hyperdivergent profiles i.e; 45% and 37% respectively. Ijaz[19] reported normodivergent vertical pattern as the most frequent one in all skeletal groups. Hameed et al[20] reported majority of patients with orthodontic profile, followed by hyperdivergent profiles. However, Siriwat et al[26] while correlating malocclusion and facial morphology concluded that 'hypodivergent pattern is dominant.

The study showed that most of normodivergent profiles were having skeletal class I and hyperdivergent were having skeletal class II pattern. Siriwat et al[26] while correlating sagittal and vertical facial morphology concluded that hypodivergent pattern is dominant in skeletal Class II and Class III. While Ijaz[19] showed that most of hyperdivergent were presenting skeletal class II. This study for the first time has incorporated number of variables while evaluating pattern of vertical facial and sagittal relationships in a hospital setup. Differences between Pakistan and other countries would be expected because of differences in racial and ethnic composition. Results cannot be representative of the whole of the Pakistani population and thus expected to varying degree of prevalence of dental anomalies. However, in view of the biased nature of the sample as most of the patient use to report when the deformity became obvious enough to the orthodontic department, the data of this orthodontic study cannot be extrapolated to the whole of the Pakistani population.

CONCLUSIONS

In this hospital based study,

- Normo divergent patients were skeletal class I and hyperdivergent patients were skeletal class II.
- Most of the patients reported during second decade of life.
- Identifying occlusal problems, their incidence and the need for treatment can help to determine the appropriate treatment plan and manpower needed in orthodontics.

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