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ORIGINAL RESEARCH

Comparative Assessment of Facial Asymmetry in Malocclusion using Posteroanterior View

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ABSTRACT

Aim: The study was conducted to assess facial asymmetry in various dental malocclusions and to determine asymmetry in lower, mid, and upper face and jaws using posteroanterior cephalometric analysis.

Materials and methods: Overall, 120 posteroanterior cephalograms were taken of individuals between 12 and 25 years of both sexes, and were divided into four groups: Angle's class I excellent occlusion, Angle's class I malocclusion, Angle's class II malocclusion, and Angle's class III malocclusion. These cephalograms were traced and Grummon's analysis was performed.

Results: In Angle's class I occlusion and Angle's class II malocclusion, the results obtained showed asymmetry present in the upper face. Correlation was found between occlusion, malocclusion, and facial asymmetry.

Conclusion: Facial asymmetry was found in all dental occlusions whether excellent or malocclusion group, with maximum asymmetry having upward trend toward upper face starting from lower.

Clinical significance: For the success of the orthodontic treatments in various types of malocclusion and to determine the facial asymmetry, posteroanterior view can be very helpful, as it gives additional information which can be utilized to augment treatment planning and improve prognosis in terms of relapse prevention.

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INTRODUCTION

Asymmetry in the craniofacial areas can be recognized as differences in the size or relationships of the two sides of the face. This may be the result of discrepancies either in the form of individual bones or a malposition of one or more bones in the craniofacial complex. The asymmetry may also be limited to the overlying soft tissues.[1]

Facial asymmetries are imbalances that occur between the homologous parts of the face affecting the proportion of these parts with regard to size, form, and position on opposite sides of the plane, line, or point. Facial asymmetry exists in orthodontic as well as nonorthodontic individuals. Because facial asymmetries are very often present with dental asymmetries, they are of clinical importance in the treatment of malocclusions of the teeth.[2]

Vig and Hewitt[3] and Lundstrom[4] explained that asymmetry can be genetic or nongenetic in origin and that it is usually a combination of both. Asymmetries can be classified according to the structures that are involved. Dental asymmetries can be caused by local factors such as early loss of primary teeth, congenitally missing teeth, and habits such as thumb sucking. Lack of exactness in genetic expression affects the teeth on the right and left sides, causing asymmetries in mesiodistal crown diameters.

The aims and objectives of the study were to assess the asymmetry in lower, mid, and upper face and jaws using posteroanterior cephalometry, and to ascertain the correlations between occlusion and facial asymmetry.

MATERIALS AND METHODS

In all, 120 subjects were selected from the population of Moradabad city of Uttar Pradesh, India, using the variables as defined later. The sample selected ranged in the age group of 12 to 25 years, in both sexes. Selected individuals were subjected to cephalometric radiography in the Department of Oral Medicine and Radiology using a cephalostat of a cephalometric machine manufactured by Villa Systemi (Italy).

The selected subjects had Angle's class I excellent occlusion, Angle's class I malocclusion, Angle's class II malocclusion, and Angle's class III malocclusion and were named as groups I, II, III, and IV respectively. These subjects were selected based on the following:

- Harmonious and apparently symmetrical face
- Full complement of teeth with good posterior interdigitation excluding 3rd molars
- No history of trauma
- No history of prior orthodontic or surgical treatment
- No evidence of temporomandibular joint (TMJ) dysfunction or congenital TMJ ankylosis

The parameters used for group I were detailed as having Angle's class I molar relation, overjet = 2 to 4 mm, overbite = 2 to 4 mm, symmetrical upper and lower arch, spacing = 0 to 2 mm, contact point displacement = 0 to 2 mm, and rotation = mild degree.[5] The subject's name, age, and sex were recorded and consent was taken, following clinical examination, and their posteroanterior cephalograms were taken using standardized technique. The exposure parameters were 75 kVp, 10 mA, and exposure time was 1.60 seconds.[6]

Following landmarks and planes were included in the study (Fig. 1 and Table 1):

- Cg-Cristagalli—A vertically elongated diamond shaped radiopacity appearing between the orbital outline on posteroanterior cephalogram. Used to establish a mid-sagittal reference (MSR) line.[7]

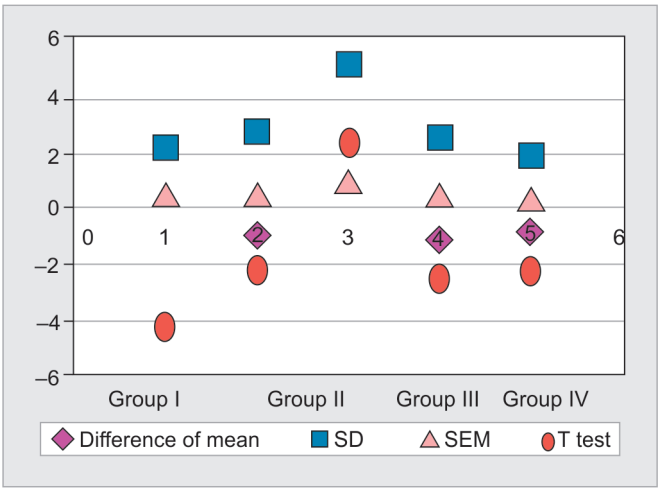

Fig. 1: Combined asymmetric variables of all four groups

Table 1: Cephalometric line

- Reference (vertical line)—MSR[9]
- Maxillary width (horizontal line)—J to MSR jugal- crossing of the outline of the tuberosity with the outline of the jugal process (the medial aspects of the jugal processes)[9]
- Nasal cavity width (horizontal width)—NC to MSR widest points in nasal capsule[9]
- Mandibular width (horizontal line)—Ag to MSR antegonian-trihedral eminence above gonial notch[9]

- Z—Zygomatic suture point: medial and anterior junction of zygomatic bone with frontal bone (right and left).[8]
- ZA—Centers of the zygomatic arches (right and left).[8]
- J—Jugal process: lowest point on the curve of zygomatic bone. Also, the point on the jugal process of the maxilla at a crossing with the tuberosity of the maxilla, in the frontal.[8]
- NC—Lateral-most point on the inside surface of bony nasal cavity (right and left).[8]
- Ag—Antegonion. Highest point in the antegonial notch. Antegonial point on the mandibular border at lower margin of trihedral eminence above gonial notch (right and left).[9]
- A6—Upper first permanent molar. In the frontal (cephalogram) it is the buccal-most point on the crown of upper first molar.[8]
- B6—Lower first permanent molar. Frontally, it is the buccal-most point on the crown of the lower molar.[8]
- Me—Menton. Lower most point of the contour of the chin.[8]

Areas for maxillomandibular comparison:

- Maxillary–Cg–J–MSR
- Mandibular–Cg–Ag–MSR

Horizontal asymmetry assessment involved measurement of the horizontal lines which were the perpendicular projections of the bilateral landmarks on the MSR, i.e., Z-MSR, ZA-MSR, NC-MSR, J-MSR, A6-MSR, B6-MSR, and Ag-MSR, and were measured for right and left sides. A difference in reading of right and left sides of a pair of landmarks provided the horizontal asymmetry of the landmarks (Fig. 2).

The vertical lines between the points of perpendicular projections on MSR were drawn to depict any vertical discrepancy between the landmarks of right and left sides. A vertical difference in the left and right points provided the vertical asymmetry of the landmarks (Fig. 3).

Mandibular deviation was assessed by measuring the linear horizontal distance, between the points of line MSR falling on the lower border of the mandible and Menton (Fig. 2).

Four lines were constructed, perpendicular to MSR, from Ag and from J, bilaterally. Lines connecting Cg and J

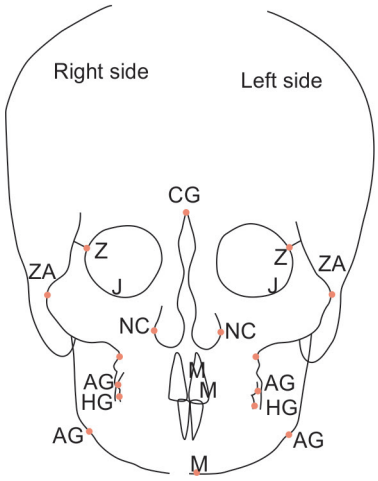

Fig. 2: Image of posteroanterior cephalogram tracing with the landmarks used in the analysis

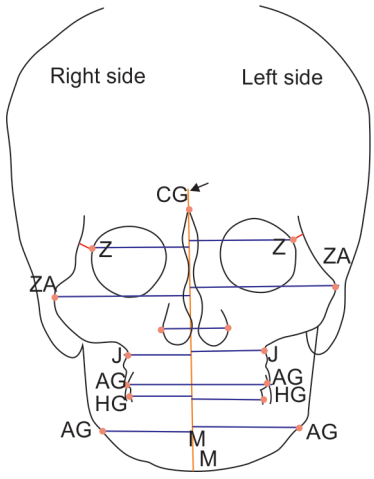

Fig. 3: Maxillomandibular relationships. MSR line (red), CG-J-MSR triangle on the left side (pink), CG-AG-MSR triangle on the right side (blue)

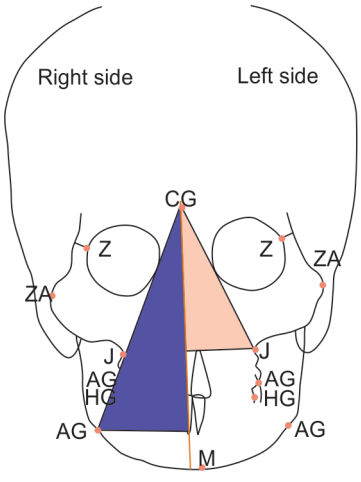

Fig. 4: Constructed lines used for linear asymmetry assessment. MSR (red), and lines Z-MSR, ZA-MSR, NC-MSR, J-MSR, A6-MSR, B6-MSR, AG-MSR (blue) and lines used for mandibular deviation assessment M-MSR (orange)

and lines from Cg to Ag were also drawn. Two pairs of triangles are constructed and each pair is bisected by MSR. Their areas were calculated and compared with that of the opposite side (Fig. 4).

RESULTS

Group I shows mean, coefficient of variation (CV), standard deviation (SD), and standard error of mean (SEM) for both right and left sides (Table 2). When mean values of all parameters were compared between right and left sides, it is observed that Z to MSR variables are significantly different at the 5% level of significance. Whereas among other parameters, insignificant difference was observed, indicating that in most of the variables, there is no evidence of any facial asymmetry.

Group II shows mean, CV, SD, and SEM for both right and left sides (Table 3).

When mean values of all parameters are compared between the right and left sides, it is observed that Z to MSR and Ag to MSR variables are significantly different at the 5% level of significance. Whereas among other parameters, insignificant difference was observed, indicating that in most of the variables, there is no evidence of any facial asymmetry in individual having Angle's class I malocclusion.

Group III shows mean, CV, SD, and SEM for both right and left sides (Table 4). When mean values of all

Table 2: Mean, SD, SEM, CV, and t-test in group I having class-1 excellent occlusion for assessing facial asymmetry in different variables

	Mean		*SD*		*SEM*		*CV*		
Horizontal	*Left*	*Right*	*Left*	*Right*	*Left*	*Right*	*Left*	*Right*	*t-test*
Z-MSR	47.87	49.36	2.12	3.02	0.36	0.51	4.43	6.11	−4.51***
ZA-MSR	66.67	67.73	3.39	4.27	0.57	0.72	5.09	6.30	−1.64
NC-MSR	14.97	15.69	1.49	2.04	0.25	0.34	9.98	12.98	−1.66
J-MSR	32.96	33.50	2.22	2.29	0.38	0.39	6.75	6.83	−1.43
A6-MSR	30.43	30.83	2.25	2.54	0.38	0.43	7.39	8.23	−0.98
B6-MSR	30.39	31.00	2.28	2.38	0.39	0.40	7.50	7.69	−1.21
Ag-MSR	43.84	43.27	3.48	3.19	0.59	0.54	7.93	7.37	0.84

Level of significance of t-test is >0.05 is nonsignificant; <0.05 is 2.03*; <0.01 is 2.73**; and <0.001 is 3.60*** at 33 df

Table 3: Mean, SD, SEM, CV, and t-test in group II having class I malocclusion for assessing facial asymmetry in different variables

	Mean		*SD*		*SEM*		*CV*		
Horizontal	*Left*	*Right*	*Left*	*Right*	*Left*	*Right*	*Left*	*Right*	*t-test*
Z-MSR	47.77	48.95	3.18	3.03	0.58	0.55	6.65	6.18	−2.39
ZA-MSR	67.63	66.72	4.01	4.12	0.73	0.75	5.93	6.17	1.31
NC-MSR	15.87	15.50	2.19	2.48	0.40	0.45	13.82	16.03	0.77
J-MSR	33.98	33.52	2.25	2.83	0.41	0.52	6.61	8.45	0.89
A6-MSR	30.90	29.20	2.56	5.95	0.47	1.09	8.28	20.39	1.69
B6-MSR	30.62	29.92	2.65	2.93	0.48	0.54	8.66	9.81	1.23
Ag-MSR	43.95	41.73	3.96	3.55	0.72	0.65	9.02	8.51	2.31

Level of significance of t-test is >0.05 is nonsignificant; <0.05 is 2.05*; <0.01 is 2.76**; and <0.001 is 3.67*** at 28 df

Table 4: Mean, SD, SEM, CV, and t-test in group III having class II malocclusion for assessing facial asymmetry in different variables

	Mean		*SD*		*SEM*		*CV*		
Horizontal	*Left*	*Right*	*Left*	*Right*	*Left*	*Right*	*Left*	*Right*	*t-test*
Z-MSR	46.87	48.10	3.57	3.68	0.65	0.67	7.63	7.66	−2.67*
ZA-MSR	65.27	65.93	5.43	5.14	0.99	0.94	8.33	7.80	−0.68
NC-MSR	15.53	16.25	3.46	3.84	0.63	0.70	22.27	23.61	−1.50
J-MSR	31.80	32.32	4.85	5.13	0.89	0.94	15.25	15.86	−1.33
A6-MSR	30.33	30.17	3.45	3.71	0.63	0.68	11.37	12.29	0.27
B6-MSR	29.65	29.73	3.31	3.15	0.60	0.57	11.17	10.59	−0.14
Ag-MSR	42.37	42.52	4.37	3.85	0.80	0.70	10.33	9.05	−0.20

Level of significance of t-test is >0.05 is nonsignificant; <0.05 is 2.05*; <0.01 is 2.76**; and <0.001 is 3.67*** at 28 df

Table 5: Mean, SD, SEM, CV, and t-test in group IV having class III malocclusion for assessing facial asymmetry in different variables

	Mean		*SD*		*SEM*		*CV*		
Horizontal	*Left*	*Right*	*Left*	*Right*	*Left*	*Right*	*Left*	*Right*	*t-test*
Z-MSR	47.90	48.32	3.21	3.88	0.64	0.78	6.70	8.03	−0.58
ZA-MSR	66.04	66.22	4.68	4.70	0.94	0.94	7.09	7.10	−0.21
NC-MSR	15.04	15.44	1.43	1.77	0.29	0.35	9.50	11.46	−0.95
J-MSR	32.70	33.60	3.15	3.22	0.63	0.64	9.64	9.60	−2.34*
A6-MSR	29.68	30.34	2.33	3.16	0.47	0.63	7.84	10.41	−1.28
B6-MSR	29.84	30.60	2.63	3.11	0.53	0.62	8.81	10.17	−1.43
Ag-MSR	42.76	43.36	4.02	4.30	0.80	0.86	9.41	9.93	−0.58

Level of significance of t-test is >0.05 is nonsignificant; <0.05 is 2.07*; <0.01 is 2.81**; and <0.001 is 3.77*** at 23 df

parameters are compared between right and left sides, it is observed that Z to MSR variables are significantly different at the 5% level of significance. Whereas among other parameters, insignificant difference was observed, indicating that in most of the variables, there is no evidence of any facial asymmetry in individuals having Angle's class II malocclusion.

Group IV shows mean, CV, SD, and SEM for both right and left sides (Table 5). When mean values of all parameters are compared between right and left sides, it is observed that J to MSR variables are significantly different at the 5% level of significance. Whereas, among other parameters, insignificant difference was observed, indicating that in most of the variables, there is no evidence of any facial asymmetry in individuals having Angle's class III malocclusion.

Table 6 shows variables having asymmetry in all four groups I, II, III, and IV.

Table 6 and Figure 5 show variables having highly significant difference in Z-MSR between right and left measurements in group I and the same is true in groups II to III, whereas insignificant difference exists in Angles class III malocclusion. Measurement of Ag-MSR in group band J-MSR in group IV is showing significant difference at 5% which is an indication of asymmetry.

Table 6: Variables having asymmetry in all four groups

Group	*Group I*	*Group II*		*Group III*	*Group IV*
Variables	Z-MSR	Z-MSR	Ag-MSR	Z-MSR	J-MSR
Difference of mean	1.49	−1.18	2.22	−1.24	−0.90
SD	1.95	2.71	5.26	2.53	1.93
SEM	0.33	0.50	0.96	0.46	0.39
t-test	−4.51***	−2.39*	2.31*	−2.67*	−2.34*
CV	131.25	−229.16	237.51	−204.86	−213.97

For group I, level of significance of t-test is >0.05 is nonsignificant; <0.05 is 2.03*; <0.01 is 2.73**; and <0.001 is 3.60*** at 33 df; for groups II and III, level of significance of t-test is >0.05 is nonsignificant; <0.05 is 2.05*; <0.01 is 2.76**; and <0.001 is 3.67*** at 28 df; for group IV, level of significance of t-test is >0.05 is nonsignificant; <0.05 is 2.07*; <0.01 is 2.81**; and <0.001 is 3.77*** at 23 df

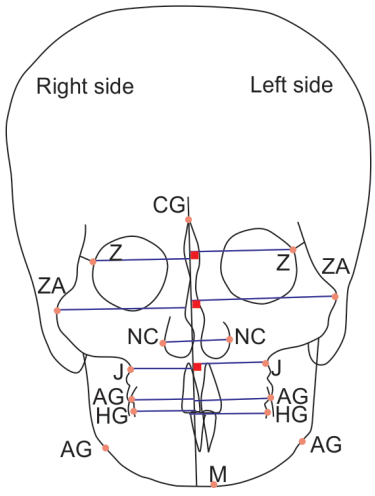

Fig. 5: Linear vertical discrepancies, MSR line, vertical discrepancies shown in blocks

Table 7 shows the mean, CV, SD, SEM between right and left maxillomandibular comparison measurement, using CG-AG-MSR and CG-J-MSR to assess the asymmetry.

From the table, it is observed that measurement of CG-J-MSR shows significant difference at the 5% level for right and left sides, indicating thereby asymmetry in maxillary region for group III and variable CG-AG-MSR in group II.

For rest of the groups, in maxillomandibular comparison, measurements have insignificant difference at the 5% level for right and left sides, indicating thereby symmetry between right and left sides. The CV was also found to be consistent in all parameters used to assess asymmetry.

Table 8 shows the mean, SD, SEM, and CV of variables used to assess the asymmetry in all the four groups. The CV was found to be variable in a parameter used to assess mandibular deviation. The CV was found to be highest in group II, compared with the other groups.

Table 9 shows excellent occlusion having molar class I relation correlated for different variables having malocclusion for asymmetry in horizontal and vertical planes and difference in maxillomandibular comparison measurements and mandibular deviations.

DISCUSSION

Facial asymmetry and associated problems in the dentition are naturally occurring problems, which can be detected by comparing it with homologous parts of the face. The risk factors for the facial asymmetry can be genetic or congenital malformations, environmental factors like parafunctional habits, and, on certain occasions, facial trauma, and it can also be seen in cases where there are functional deviations of the mandible because of tooth interferences. Case selection becomes important, as based on severity of the facial asymmetry, it is decided whether it qualifies for orthodontic treatment or it has to undergo orthopedic corrections. In such cases, posteroanterior view becomes very useful.

It has been observed that facial asymmetries and a variety of other functional deviations can be treated orthodontically. But caution has to taken because patients' desires and unrealistic expectations in the presence of large deviation or facial asymmetry cannot be treated orthodontically and also if attempted by the orthodontist, it can lead to failure of the case. The posteroanterior view can be very much helpful in deciding the same.

In the literature, there are many studies reported, but still there is dearth of information in the Indian scenario regarding use of posteroanterior cephalometric view and facial asymmetry in the different types of malocclusion; hence, the present study was conducted with the aim to assess the asymmetry in lower, mid, and upper face and jaws using posteroanterior cephalometry, and to

Table 7: Mean, SD, SEM, CV, and t-test in all groups for variable CG-J-MSR and CG-AG-MSR to assess asymmetry

	Mean		*SD*		*SEM*		*CV*		
Groups	*Left*	*Right*	*Left*	*Right*	*Left*	*Right*	*Left*	*Right*	*t-test*
CG-J-MSR									
I	1057.53	1069.44	141.99	136.3	24	23.04	13.43	12.74	−0.97
II	1082.75	1086.98	172.8	179.96	31.55	32.86	15.96	16.56	−0.19
III	978.98	1004.43	216.69	206.27	39.56	37.66	22.13	20.54	−2.18*
IV	1020.13	1049.41	120.71	142.46	24.14	28.49	11.83	13.58	−2
CG-AG-MSR									
I	2299.06	2279.99	249.56	275.92	42.18	46.64	10.85	12.1	0.57
II	2347.05	2244.3	340.5	286.68	62.17	52.34	14.51	12.77	2.25*
III	2186.17	2212.16	364.53	333.71	66.55	60.93	16.67	15.09	−0.68
IV	2227.49	2225.63	346.39	314.05	69.28	62.81	15.55	14.11	0.04

For group I, level of significance of t-test is >0.05 is nonsignificant; <0.05 is 2.02*; <0.01 is 2.70**; and <0.001 is 3.46*** at 53 or 58 or 63 df; For groups II and III, level of significance of t-test is >0.05 is nonsignificant; <0.05 is 2.05*; <0.01 is 2.76**; and <0.001 is 3.67*** at 28 df; For group IV, level of significance of t-test is >0.05 is nonsignificant; <0.05 is 2.07*; <0.01 is 2.81**; and <0.001 is 3.77*** at 23 df

Table 8: Mandibular deviations

	I	*II*	*III*	*IV*
Mean	0.6	0.5	0.37	0.6
SD	1.02	1.6	1.02	1.53
SEM	0.1	0.09	0.07	0.12
CV	170.06	319.48	277.24	255.72
Range min	−1	−3	−1.5	−2
Range max	4	5.5	2.5	2.5

ascertain the correlations between occlusion and facial asymmetry.

There are four types of dentofacial asymmetries studied by Cheney[10] among which the vertical displacements are asymmetrical variations which result from height difference in size, shape, and/or form between dentofacial parts on the two sides of the face.

Thompson[11] studied facial symmetry and stated that it must be recognized that there is no truly symmetrical face regardless of race, age, or period of an individual. Fischer[2] noted that the factors responsible for asymmetries in the dentofacial complex are not confined to the teeth and alveolar process. They may be found in the various component parts of the face and all the structures surrounding the teeth.

Table 9: Correlation coefficient between various variables with excellent occlusion and malocclusion

Correlation in horizontal parameters			
	Malocclusion		
Ex. Occ	*Groups I vs II*	*Groups I vs III*	*Groups I vs IV*
Z-MSR	0.076	0.133	0.239
ZA-MSR	0.33	0.211	0.064
NC-MSR	−0.202	−0.108	0.208
J-MSR	−0.068	0.059	0.194
A6-MSR	0.066	0.252*	0.09
B6-MSR	0.008	0.096	−0.196
Ag-MSR	−0.2 I	−0.03	−0.053
Correlation in vertical parameters			
Z-MSR	0.048	0.430***	−0.364***
ZA-MSR	−0.271*	0.390**	−0.017
NC-MSR	−0.357**	0.213	0.308*
J-MSR	−0.288*	0.026	−0.045
A6-MSR	−0.008	−0.107	0.105
B6-MSR	0.049	−0.08	−0.326**
Ag-MSR	−0.122	−0.191	0.008
Correlation in maxillomandibular variable			
CG-AG-MSR	0.23	−0.041	0.011
CG-J-MSR	0.369**	−0.03	−0.108
Correlation with mandibular deviation			
M-MSR	−0.016	−0.196	0.001

*Indicates significant difference; **Indicates highly significant difference; ***Indicates very highly significant difference

It was seen that variable Z-MSR in the groups I, II, III; Ag-MSR of class I malocclusion; and J-MSR of group IV showed significant difference in comparison of right and left sides. The right side was more deviated as compared with the left side. This was in accordance with the previous study done by Haraguchi et al[12] who stressed that the frequent laterality of face may be ascribed to the dominant growth potential of the jaw's right side. The present finding can be attributed to the fact that genetics play a significant role in the growth of the mandible on either side, or trauma at the time of growth of the mandible would have caused this particular problem.

It was observed that measurement of CG-J-MSR showed significant difference for right and left sides, indicating asymmetry in maxillary region for group III. Grummons and Kappeyne van de Copello[7] suggested that there is a slight tendency for most of the cranial bones to be larger on the right side in the underformed (normal) crania. Asymmetry of upper face occurs to prevent midline deviations. This means that at the cost of maintenance of midline, asymmetry of the face results.

Measurement of CG-Ag-MSR showed a significant difference between right and left sides, indicating thereby asymmetry in the mandibular region for group II. This is in accordance with the study done by Haraguchi et al;[12] there was a general tendency of the inferior landmarks to deviate more frequently and at greater distances than the more superiorly located landmark because growth of mandible is largely seen at the condylar region, the mandible is likely to show gradual deviation during growth period, as if it swings with a condylar head on the affected side as its center of rotation. Athanasiou et al[9] described this gradual deviation with the help of an animal experiment and stressed that asymmetry of the face is related to functional demands of the masticatory apparatus and the musculoskeletal systems. Skeletal asymmetry reflects onto the soft tissue of the face. In this study, asymmetry was obvious in the upper jaw, but could not extend up to the zygoma. The finding can be attributed to either genetics or the functional demands of the masticatory apparatus and the musculoskeletal system of the body.

Maximum CV in mandibular deviation was noticed in group III, and minimum deviation was seen in the group II. This shows that although individuals have excellent occlusion, still they exhibit asymmetry; this point was supported by Utreja.[13] One of the studies done by Sheats et al[14] who studied prevalence of orthodontic asymmetries stated that among orthodontic patients, the most common asymmetry trait was mandibular midline deviation from the facial midline and the present study was no exception. Significant correlation was found between groups II and III, in measurement of A6-MSR, which demonstrates that as the malocclusion increases in severity from groups I to III, the value of A6-MSR increases as well.

When correlation was evaluated in vertical variable, it was observed that as malocclusion increases from groups I to III, the Z-MSR value increases and when the value of

measurement decreases, the correlation demonstrated that as malocclusion increases from groups I to IV, it is evident in the measurement of Z-MSR. Similarly, increase in ZA-MSR was observed with increase in severity of malocclusion from groups II to III. Measurement of ZA-MSR, NC-MSR, J-MSR demonstrated that with increase in severity of malocclusion from groups I to II, the value of these variables also decreases. Measurements of variable B6-MSR demonstrate that with increase in severity of malocclusion from groups I to IV, the value decreases. For NC-MSR variable, it was seen that with increase in severity of malocclusion from groups I to IV, the value increases. The present study results were in accordance with Thompson,[11] Grummons and Kappeyne van de Copello,[7] and Athanasiou et al.[9]

When correlation was done in the maxillomandibular parameter, it was seen that as the severity of malocclusion increases from groups I to III, the value of Cg-J-MSR also increases. Our findings were contrary to the findings of Thompson[11] in which insignificant difference between malocclusion and asymmetry was observed, while it is supporting that of Fischer[2] who reported that facial asymmetry was very often present with malocclusion.

Shah and Joshi[15] and Chierici et al[16] reported in their study that significantly more subjects were chewing on the right side than on the left side as a matter of habit and since the force of mastication is transmitted from the teeth to the facial and cranial bones, this may be a factor responsible for the right side being larger than the left. This and other studies may be considered for the variation of the jaw size, thereby resulting in asymmetry of facial proportions. This study highlights the understanding of naturally occurring variation in dentofacial complex. It would lead to further research on preventive as well as definitive diagnosis and treatment protocols.

CONCLUSION

Following conclusions were drawn:

- Asymmetry of face is a common finding in case of all types of dental malocclusion.
- In Angle's class I occlusion and Angle's class II malocclusion, the results of parameters obtained show that increased asymmetry is present in the upper face, and the asymmetry increases in magnitude as we approach higher in the craniofacial skeleton.
- Correlation was found between occlusion, malocclusion, and facial asymmetry.

CLINICAL SIGNIFICANCE

Successful practice of orthodontics requires good case selection; good case selection can be complemented by the use of advanced radiography in the form of posteroanterior cephalometrics. By the use of advanced radiography, the ambiguity of the treatment planning by the orthodontist can be removed and the unnecessary expectations of the patient from the orthodontic treatments can also be minimized. Facial asymmetry is a naturally occurring phenomenon and can be dealt with judiciously with the help of posteroanterior cephalometrics.

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