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An Original Research – To Evaluate the Association between Vertical Facial Morphology and Overjet in Untreated Class II Malocclusion Subjects in Jaipur Population.

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ABSTRACT:
Aim: To evaluate the association between vertical facial morphology and overjet in untreated class II malocclusion subjects in jaipur population.
Method: Standardized lateral cephalograms and casts of subjects having Class II malocclusion was selected from exisiting records of patients from Department of Orthodontics, NIMS Dental College, NIMS university Jaipur.
Lateral cephalograms and casts of 60 patients, of age above 14 years , both males and females were divided into three experimental groups and one control group:
Group I :Lateral cephalograms and casts of 20 patients with increased overjet (less than or equal to 3 mm)
Group II: Lateral cephalograms and casts of 20 patients with increased overjet (more than 3 mm but less than or equal to 6 mm).
Group III :Lateral cephalograms and casts of 20 patients with increased overjet (more than 6 mm)
Control Group: Lateral cephalograms and casts of 20 patients with normal occlusion, normal overbite, normal overjet, no interdental spacing or crowding, balanced facial profile.
Overjet was measured on study casts taken for each subject as the distance from the lingual surface of the mandibular central incisor to the labial surface of the most prominent maxillary incisor.
Result: The results revealed normal anterior cranial base length (S-N), enlarged posterior cranial base length (S-Ar), and normal posterior facial height (S-Go) in all groups. The mean length of the mandibular ramus (Ar-Go) and the mandibular body (Go-Me) was shorter in the extreme overjet group. The mean sella angle (N S Ar) tended to be increased in all groups. There was a difference in gonial angle (Ar Go Me) and articular angle (S Ar Go), in each group. The mean values from S-N plane to palatal, occlusal and mandibular plane were normal.
There was no mean difference in the SNA and SNB values in each of the malocclusion group. There were variations in mean of all the dentoalveolar parameters in each malocclusion group.
Conclusion: An association was found between the overjet value and the tendency toward a hyperdivergent pattern. As the overjet increased, mandibular plane angle (S-N:Go-Me), palatal plane to mandibular plane (SPP:Go-Me), Sum (Bjork), Y-axis angle and Lower gonial angle (N Go Me) tended to increase and Jarabak ratio (S-Go/N-Me), Ramal length Ar-Go tended to decrease.
Subjects with a normal overjet showed a horizontal facial pattern and a posterior inclination of the

maxilla, whereas increased overjet subjects exhibited a neutral facial pattern with proclined lower incisors. In contrast, subjects with an extreme overjet had a vertical facial pattern, anterior inclination of the maxilla, and a short mandibular ramus. The mandible was retrognathic and the maxilla was normally positioned in the three groups.

KEYWORDS:overjet,malocclusion

I. INTRODUCTION

In Orthodontics, Angle's Class II malocclusion is the second most frequently seen disharmony that has been studied in many different ethical groups and population. Because esthetic and facial disharmony is easily recognized, Class II division 1 malocclusion is of a great concern for children, adults and their parents[1].Angle's Class II malocclusions have been described as the frequently encountered problem in orthodontic treatment plan. Epidemiologic studies had shown that 20% to 30% of children has Class II malocclusion [1].An understanding of dental in relation to skeletal components that contribute major to malocclusion is important in orthodontic treatment planning. The most of the patients with Class II div 1 malocclusion have the presence of underlying skeletal discrepancy between maxilla to mandible [2]

In some patients, the Class II skeletal base component is due to both maxillary protrusion and mandibular retrusion and in others it has been found that the maxilla was in the normal position while the mandible was retrusive. Also, the facial pattern tends to be a hyperdivergent pattern in Class II div. Some authors have revealed that there is no difference in vertical facial morphology between Class II div 1 and Class II div 2 except for position of the maxillary incisors [2].

Most investigations selected patients on the basis of Angle's classification which failed to distinguish between skeletal and dental malocclusion and anteroposterior dental relationships, these could lead to the possibility of one malocclusion overlapping into the other. Second most investigations selected dental Class II patients who may have a Class I or a Class II skeletal pattern. End result, the relationship between overjet and craniofacial morphology appears to have been least studied [3].In diagnosis, it is important to obtain an accurate measurement of overjet, as this describes the sagittal relationship between the upper and lower central incisors. It is generally accepted that increased overjet is due to a growth deficit of the jaws rather than poor positioning of the dental elements [4]

In previous studies, a relatively normal anterior cranial base length and decreased posterior facial height were found in Class II div 1 malocclusion.[19,] On the other hand, a few previous studies reported an enlarged anterior cranial base and a decrease in posterior cranial base length in Class II div 1. According to studies conducted by Pancherz H,Zieber K and Hoyer B divergence in findings were attributed to ethnic differences.[1,3]

According to studies conducted by P W Ngan , E Byczek, J Scheick Class II malocclusion can be detected early. The majority of the Class II cases showed mandibular skeletal retrusion or a combination of horizontal and vertical abnormalities of the mandible rather than maxillary protrusion. These skeletal differences remain through puberty without orthodontic intervention. Individual variations were found within each type of malocclusion.[12]

According to studies conducted by İsmail Ceylan, İbrahim Yavuz, Fatma Arslan there were statistically significant differences in measurements of angles 1–NA, 1–1̄, 1–SN, 1̄–SN, 1̄–MP, and SN–AB among the overjet groups.[22]

Class II malocclusion should not only be considered as a sagittal plane abnormality, but also as transverse and vertical plane abnormalities also to be considered. ANB angle, indicates a skeletal discrepancy between the maxillary and mandibular jaws, which must be brought back into harmony during treatment. This value, as well as being influenced by the anteroposterior relationship between the maxillary ans mandibular jaws may also be influenced by the vertical height of the face. In many Class II malocclusion cases,the vertical plane is also affected, and patients present a vertical pattern with mandibular clock-wise rotation which worsens skeletal Class II malocclusion and facial profile [3,4].In the present study, an attempt has been made to evaluate the association between facial morphology and overjet in untreated Class II patients and to identify the craniofacial characteristics of Class II patients with normal, increased and extreme overjet in a sample of Jaipur population.

II. AIM AND OBJECTIVES

1. To evaluate the association between vertical facial morphology and overjet in untreated Class II subjects.
2. To identify the craniofacial characteristics of Class II patients with normal, increased and extreme overjet in a sample of Jaipur population.

III. METHOD AND MATERIAL

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Standardized lateral cephalograms and casts of subjects having Class II malocclusion was selected from exisiting records of patients from Department of Orthodontics, The NIMS Dental College NIMS university,Jaipur.

Study duration-january 2015 to December 2016.
Sample size-60 patients
Lateral cephalograms and casts of 60 patients, of age above 14 years for both males and females was divided into three experimental groups and one control group:

Group I :Lateral cephalograms and casts of 20 patients with increased overjet (less than or equal to 3 mm)
Group II: Lateral cephalograms and casts of 20 patients with increased overjet (more than 3 mm but less than or equal to 6 mm).
Group III :Lateral cephalograms and casts of 20 patients with increased overjet (more than 6 mm)
Control Group: Lateral cephalograms and casts of 20 patients with normal occlusion, normal overbite, normal overjet, no interdental spacing or crowding, balanced facial profile.

INCLUSION CRITERIA
a) Dental Class II malocclusion (bilateral distal molar relationships of more than one-half cusp width).
b) Age range of above 14 years
c) No missing permanent teeth

EXCLUSION CRITERIA
a) Patients with history of trauma.
b) Patients with syndromes or history of orthodontic treatment
.
ARMAMENTARIUM USED
1.Kodak 8000C digital cephalometric system.
2.Acetate sheets.
3.0.3 mm HB pencil.
4.Clips
5.Kodak film for cephalogram.

METHOD

Overjet was measured on study casts taken for each subject as the distance from the lingual surface of the mandibular central incisor to the labial surface of the most prominent maxillary incisor.
Lateral cephalograms of all the subjects were taken with Kodak 8000 C digital cephalometric system.

CEPHALOMETRIC EVALUATION
- Lacquered Polyester Single Matte **Acetate tracing paper** of 50 microns thickness used for tracing the cephalograms.
- A sharp **0.3 mm** Staedtler Mars micro **mechanical pencil** to register the important cephalometric landmarks onto the acetate sheets.
- **Geometry Instrument set** for accurate measurement of both the angular as well as the linear measurements required in this study.
- **Paper clips** for stabilization of the acetate paper onto the lateral cephalometric radiograph so as to capture the true nature of the skeletal relatio-All the films were traced and measured by the same investigator and following landmarks were traced.
- Overall, cephalometric analysis in the present study covered 19 reference angles,7 reference lines.

STATISTICAL ANALYSIS

Descriptive and Comparative Statistical analysis has been carried out in the present study. The Statistical software namely SAS 9.0, SPSS 15.0, Stata 8.0, Med Calc 9.0.1 and Systat 11.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc**.**

The mean and standard deviation for each variable were calculated using the above mentioned software system. Differences between overjet groups were tested using one-way analysis of variance (ANOVA). Differences between each malocclusion group and the control group (normal occlusion group) were evaluated using a Tukey multiple post hoc test. The significance level was set at $P < 0.05$.

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Figure1 : Landmarks Used In The Study

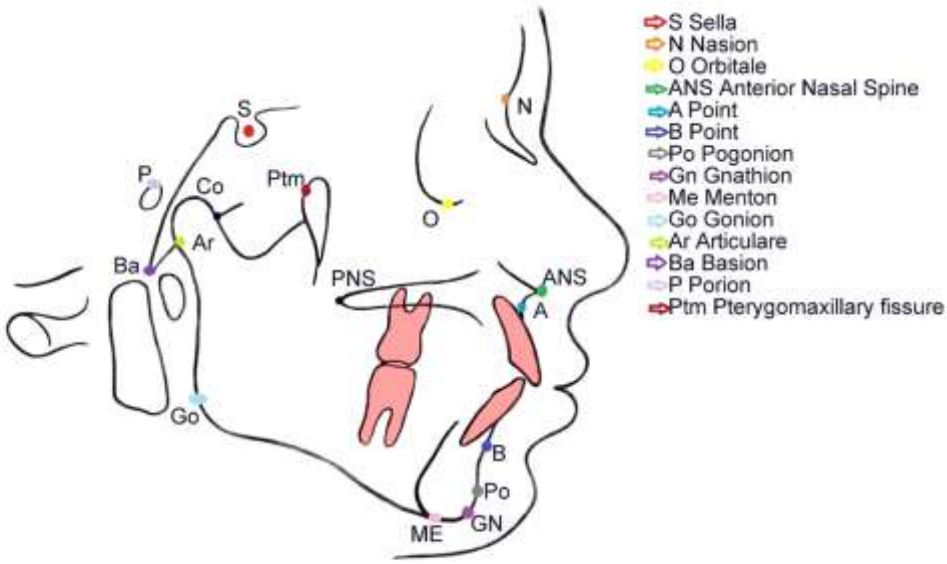

Figure. 2: Cephalometric Reference Planes and Angles

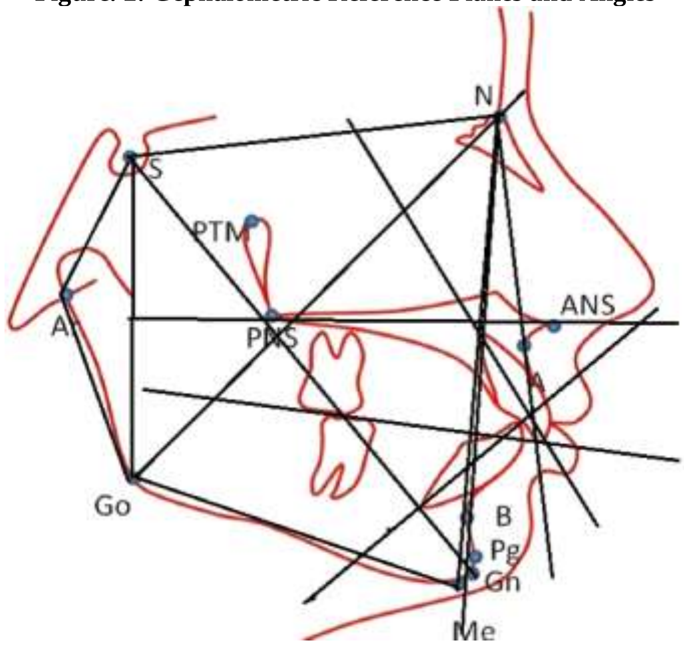

Table 1: Measurements

		Control Group	Over jet<3 mm	Overjet3-6 mm	Over jet >6 mm
S-N	Mean	67.75	67.10	68.50	66.05
	SD	3.35	3.34	3.00	3.47
	SE	0.75	0.75	0.67	0.78
S-Ar	Mean	33.10	34.80	32.65	35.60
	SD	2.49	3.66	2.52	3.33
	SE	0.56	0.82	0.56	0.74
Ar-Go	Mean	40.05	42.15	41.85	42.00
	SD	2.39	6.21	1.60	4.07

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	SE	0.54	1.39	0.36	0.91
Go-Me	Mean	66.80	66.75	63.65	60.95
	SD	3.04	5.38	2.32	4.82
	SE	0.68	1.20	0.52	1.08
S-Go	Mean	68.65	73.05	71.90	71.30
	SD	1.73	7.04	2.05	5.02
	SE	0.39	1.57	0.46	1.12
N-Me	Mean	107.60	107.65	108.85	113.15
	SD	3.15	6.13	4.33	7.70
	SE	0.70	1.37	0.97	1.72
AO-BO	Mean	3.10	2.50	3.75	5.05
	SD	0.91	0.61	0.97	1.36
	SE	0.20	0.14	0.22	0.30
s-go/n-me	Mean	65.10	66.50	65.70	62.55
	SD	2.25	4.51	2.43	1.10
	SE	0.50	1.01	0.54	0.25
Sn-spp	Mean	6.60	9.15	6.05	7.05
	SD	1.23	1.69	0.89	2.39
	SE	0.28	0.38	0.20	0.54
Sn-Ocp	Mean	17.85	15.05	16.00	14.40
	SD	2.01	4.37	2.79	3.97
	SE	0.45	0.98	0.62	0.89
Sn-Go Me	Mean	34.90	29.40	32.30	32.05
	SD	2.05	5.99	3.50	3.86
	SE	0.46	1.34	0.78	0.86
Sella angle	Mean	123.55	123.75	124.10	125.45
	SD	2.11	4.41	3.06	5.58
	SE	0.47	0.99	0.68	1.25
Art. angle	Mean	143.35	141.80	140.40	138.55
	SD	2.21	5.64	2.50	5.27
	SE	0.49	1.26	0.56	1.18
Gonial angle	Mean	125.40	123.50	127.85	130.20
	SD	2.06	5.56	3.56	5.57
	SE	0.46	1.24	0.80	1.25
Sum. Bjork	Mean	392.05	387.70	391.45	392.35
	SD	3.52	9.16	4.54	6.40
	SE	0.79	2.05	1.01	1.43
Upp.Gonial	Mean	55.60	54.50	50.05	56.45
	SD	2.50	3.41	10.81	4.84
	SE	0.56	0.76	2.42	1.08
Low. Gonial	Mean	70.30	69.50	73.75	73.25
	SD	2.60	4.08	2.22	2.15
	SE	0.58	0.91	0.50	0.48
y-axis	Mean	66.75	64.90	67.20	67.30
	SD	1.71	3.46	2.26	3.05
	SE	0.38	0.77	0.51	0.68
SNA	Mean	82.10	82.45	83.30	83.45
	SD	1.37	4.62	1.84	1.96
	SE	0.31	1.03	0.41	0.44
SNB	Mean	79.70	78.80	78.80	77.45
	SD	0.86	4.71	1.77	1.67
	SE	0.19	1.05	0.39	0.37
SN-Pog	Mean	75.65	78.80	76.90	78.80
	SD	2.72	4.85	2.15	3.93

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	SE	0.61	1.08	0.48	0.88
NA-Pog	Mean	177.55	171.10	169.00	164.45
	SD	3.19	22.94	2.20	6.41
	SE	0.71	5.13	0.49	1.43
Basal Plane	Mean	24.45	23.65	27.50	25.60
	SD	1.82	5.22	2.46	4.07
	SE	0.41	1.17	0.55	0.91
U1-SN	Mean	103.05	96.70	101.20	116.70
	SD	1.39	4.82	4.53	5.61
	SE	0.31	1.08	1.01	1.25
U1-palatal	Mean	68.85	83.05	71.05	57.15
	SD	1.46	9.00	2.16	5.04
	SE	0.33	2.01	0.48	1.13
L1-Go-Me	Mean	91.15	95.30	96.30	97.65
	SD	1.18	5.54	3.13	5.09
	SE	0.26	1.24	0.70	1.14
U1-L1	Mean	129.00	137.55	123.80	107.35
	SD	2.15	8.96	4.37	24.32
	SE	0.48	2.00	0.98	5.44

Table 2: Comparison of groups with respect to different measurements by one way ANOVA

Measurements Summary		**Four groups**				**F-value**	**p-value**
		Control Group	**Over jet <3mm**	**Overjet 3-6mm**	**Over jet >6mm**		
S-N	Mean	67.75	67.10	68.50	66.05	1.9855	0.1232
	SD	3.35	3.34	3.00	3.47		
S-Ar	Mean	33.10	34.80	32.65	35.60	4.1915	0.0084*
	SD	2.49	3.66	2.52	3.33		
Ar-Go	Mean	40.05	42.15	41.85	42.00	1.2190	0.3086
	SD	2.39	6.21	1.60	4.07		
Go-Me	Mean	66.80	66.75	63.65	60.95	9.4554	0.00001*
	SD	3.04	5.38	2.32	4.82		
S-Go	Mean	68.65	73.05	71.90	71.30	3.3949	0.0221*
	SD	1.73	7.04	2.05	5.02		
N-Me	Mean	107.60	107.65	108.85	113.15	4.3814	0.0067*
	SD	3.15	6.13	4.33	7.70		
AO-BO	Mean	3.10	2.50	3.75	5.05	24.0583	0.00001*
	SD	0.91	0.61	0.97	1.36		
s-go/n-me	Mean	65.10	66.50	65.70	62.55	7.1717	0.0003*
	SD	2.25	4.51	2.43	1.10		
Sn-spp	Mean	6.60	9.15	6.05	7.05	13.4627	0.00001*
	SD	1.23	1.69	0.89	2.39		
Sn-Ocp	Mean	17.85	15.05	16.00	14.40	3.8659	0.0125*
	SD	2.01	4.37	2.79	3.97		
Sn-Go Me	Mean	34.90	29.40	32.30	32.05	6.0196	0.0010*
	SD	2.05	5.99	3.50	3.86		
Sella angle	Mean	123.55	123.75	124.10	125.45	0.9098	0.4404
	SD	2.11	4.41	3.06	5.58		
Art. angle	Mean	143.35	141.80	140.40	138.55	4.7225	0.0045*
	SD	2.21	5.64	2.50	5.27		
Gonial angle	Mean	125.40	123.50	127.85	130.20	8.6264	0.0001*
	SD	2.06	5.56	3.56	5.57		
Sum. Bjork	Mean	392.05	387.70	391.45	392.35	2.3599	0.0781
	SD	3.52	9.16	4.54	6.40		

Upp.Gonial	Mean	55.60	54.50	50.05	56.45	4.1032	0.0094*
	SD	2.50	3.41	10.81	4.84		
Low. Gonial	Mean	70.30	69.50	73.75	73.25	10.8375	0.00001*
	SD	2.60	4.08	2.22	2.15		
y-axis	Mean	66.75	64.90	67.20	67.30	3.4086	0.0217
	SD	1.71	3.46	2.26	3.05		
SNA	Mean	82.10	82.45	83.30	83.45	1.1244	0.3446
	SD	1.37	4.62	1.84	1.96		
SNB	Mean	79.70	78.80	78.80	77.45	2.3891	0.0754
	SD	0.86	4.71	1.77	1.67		
SN-Pog	Mean	75.65	78.80	76.90	78.80	3.7431	0.0145*
	SD	2.72	4.85	2.15	3.93		
NA-Pog	Mean	177.55	171.10	169.00	164.45	4.0718	0.0097*
	SD	3.19	22.94	2.20	6.41		
Basal Plane	Mean	24.45	23.65	27.50	25.60	4.1959	0.0084*
	SD	1.82	5.22	2.46	4.07		
U1-SN	Mean	103.05	96.70	101.20	116.70	76.9188	0.00001*
	SD	1.39	4.82	4.53	5.61		
U1-palatal	Mean	68.85	83.05	71.05	57.15	79.5798	0.00001*
	SD	1.46	9.00	2.16	5.04		
L1-Go-Me	Mean	91.15	95.30	96.30	97.65	9.2813	0.00001*
	SD	1.18	5.54	3.13	5.09		
U1-L1	Mean	129.00	137.55	123.80	107.35	18.6037	0.00001*
	SD	2.15	8.96	4.37	24.32		

Table 3: Pair wise comparison of groups with respect to different measurements by Tukeys multiple post hoc procedures

Measurements	**Control vs Over jet <3mm**	**Control vs Over jet 3-6 mm**	**Control vs Over jet >6mm**	**Overjet <3mm vs Overjet 3-6mm**	**Overjet <3mm vs Over jet >6mm**	**Overjet 3-6mm vs Over jet >6mm**
S-N	P=0.9242	P=0.8891	P=0.3676	P=0.5386	P=0.7456	P=0.0958
S-Ar	P=0.2978	P=0.9660	P=0.0539	P=0.1236	P=0.8396	P=0.0157*
Ar-Go	P=0.3475	P=0.4848	P=0.4137	P=0.9953	P=0.9995	P=0.9995
Go-Me	P=1.0000	P=0.0786	P=0.0003*	P=0.0859	P=0.0003*	P=0.1658
S-Go	P=0.0152*	P=0.1139	P=0.2575	P=0.8525	P=0.6142	P=0.9751
N-Me	P=1.0000	P=0.8947	P=0.0130*	P=0.9055	P=0.0141*	P=0.0807
AO-BO	P=0.2353	P=0.1750	P=0.0001*	P=0.0010*	P=0.0001*	P=0.0007*
S-go/n-me	P=0.4118	P=0.9098	P=0.0300*	P=0.8116	P=0.0003*	P=0.0045*
Sn-spp	P=0.0002*	P=0.7188	P=0.8245	P=0.0001*	P=0.0009*	P=0.2306
Sn-Ocp	P=0.0544	P=0.3242	P=0.0108*	P=0.8154	P=0.9312	P=0.4536
Sn-Go Me	P=0.0005*	P=0.1946	P=0.1327	P=0.1223	P=0.1808	P=0.9975
Sella angle	P=0.9987	P=0.9726	P=0.4441	P=0.9927	P=0.5408	P=0.7124
Art. angle	P=0.6502	P=0.1275	P=0.0031*	P=0.7190	P=0.0775	P=0.5087
Gonial angle	P=0.5322	P=0.3079	P=0.0056*	P=0.0143*	P=0.0002*	P=0.3445
Sum Bjork	P=0.1354	P=0.9904	P=0.9988	P=0.2419	P=0.0979	P=0.9689
Upp.Gonial	P=0.9454	P=0.0330*	P=0.9736	P=0.1223	P=0.7608	P=0.0101*
Low Gonial	P=0.8148	P=0.0017*	P=0.0093*	P=0.0002*	P=0.0006*	P=0.9462
Y-axis	P=0.1437	P=0.9527	P=0.9179	P=0.0431*	P=0.0320*	P=0.9995
SNA	P=0.9780	P=0.5181	P=0.4144	P=0.7642	P=0.6620	P=0.9982
SNB	P=0.7146	P=0.7146	P=0.0472*	P=1.0000	P=0.3902	P=0.3902
SN-Pog	P=0.0331*	P=0.6863	P=0.0331*	P=0.3399	P=1.0000	P=0.3399
NA-Pog	P=0.3359	P=0.1217	P=0.0053*	P=0.9462	P=0.3091	P=0.6335
Basal Plane	P=0.8993	P=0.0480*	P=0.7517	P=0.0071*	P=0.3359	P=0.3589

U1-SN	P=0.0002*	P=0.5459	P=0.0001*	P=0.0095*	P=0.0001*	P=0.0001*
U1-palatal	P=0.0001*	P=0.5610	P=0.0001*	P=0.0001*	P=0.0001*	P=0.0001*
L1-Go-Me	P=0.0110*	P=0.0011*	P=0.0002*	P=0.8685	P=0.2788	P=0.7283
U1-L1	P=0.1790	P=0.5992	P=0.0002*	P=0.0080*	P=0.0001*	P=0.0011*

IV. RESULTS

The lateral cephalograms of 60 untreated Class II subjects of age group above 14 years of age were divided into three experimental groups and one control group based on their overjet value as measured on study casts: Group I overjet (less than 3 mm), Group II overjet (more than 3 mm but less than or equal to 6 mm), Group III overjet (more than 6 mm) and Control group with normal overjet. Lateral cephalograms of subjects with Class II malocclusion were taken. Angular and linear cephalometric parameters included 19 reference angles and 7 reference lines were calculated (Figure 1,Figure 2). The two were then compared.

Table 1 : Mean Values Between the Three Groups, and Between Each Overjet Group and the Control Group

The results revealed normal anterior cranial base length (S-N), enlarged posterior cranial base length (S-Ar), and normal posterior facial height (S-Go) in all groups. The mean length of the mandibular ramus (Ar-Go) and the mandibular body (Go-Me) was shorter in the extreme overjet group. The mean sella angle (N S Ar) tended to be increased in all groups. There was a difference in gonial angle (Ar Go Me) and articular angle (S Ar Go), in each group. The mean values from S-N plane to palatal, occlusal and mandibular plane were normal.

There was no mean difference in the SNA and SNB values in each of the malocclusion group. There were variations in mean of all the dentoalveolar parameters in each malocclusion group.

Table 2 : Difference Between Overjet Group

Significant differences were found in skeletal and dentoalveolar measurements between the three experimental groups. The Wits Appraisal and ANB were significantly larger for group III. Differences were found in the posterior facial height (S-Go) and anterior facial height (N-Me.). The mean length of the mandibular ramus (Ar-Go) and the mandibular body (Go-Me) was significantly shorter in the extreme overjet group. There were significant differences in the articular angle, gonial angle in each overjet group. The dentoalveolar parameters shows significant differences. The U1 to SN plane, Palatal Plane, L1 to mandibular plane and interincisal angle (U1 to L1) showed significant differences.

Table 3 : Differences between each Overjet Group and Control group

The mean (S-N:Go-Me) and (SPP:Go-Me) angles were significantly decreased in the control group. In contrast, the extreme overjet group showed increased (S-N:Go-Me) and (SPP:Go-Me) angles compared with the control group and with Group I (overjet 0-3 mm) and Group II (overjet 3-6mm). The mean lower gonial angle (N Go Me), the Y.

The results revealed normal anterior cranial base length (S-N), enlarged posterior cranial base length (S-Ar), and normal posterior facial height (S-Go) in all groups. The mean length of the mandibular ramus (Ar-Go) and the mandibular body (Go-Me) was shorter in the extreme overjet group. The mean sella angle (N S Ar) tended to be increased in all groups. There was a difference in gonial angle (Ar Go Me) and articular angle (S Ar Go), in each group. The mean values from S-N plane to palatal, occlusal and mandibular plane were normal. There was no mean difference in the SNA and SNB values in each of the malocclusion group. There were variations in mean of all the dentoalveolar parameters in each malocclusion group.

V.DISCUSSION

The mean length of the mandibular ramus (Ar-Go) and the mandibular body (Go-Me) was significantly shorter in the extreme overjet group (overjet > 6mm).Several previous studies reported a short length of the mandibular ramus and the mandibular body in Class II div 1 malocclusion. Although the mean sella angle (N- S- Ar) tended to be increased in all groups, this was significantly different only in Group 2. However, no significant difference was noted between the three groups, indicating no relationship between the sella angle (N S Ar) and overjet.

The mean (S-N:Go-Me) and (SPP:Go-Me) angles were significantly decreased in the Group 1 (normal overjet group), indicating a hypodivergent pattern in this group. In contrast, the Group 3 (extreme overjet group) showed increased (S-N:Go-Me) and (SPP:Go-Me) angles compared with the control group and with Groups 1 and 2, demonstratingahyperdivergent pattern..Furthermore, Jarabak ratio i.e. the mean facial height ratio (S-Go/N-Me) was significantly increased in the Group I, indicating a hypodivergent pattern in this group. In contrast, the Group 3 showed a decrease in (S-Go/N-Me), indicating a hyperdivergent pattern in this group.

Our study is inconsistent with Siriwat and Jarabak [5] found that a neutral growth pattern was dominant in Class II division 1 malocclusion and a hypodivergent pattern was dominant in Class II division 2 malocclusion.

.No significant difference in angle SNA was found between the three groups, suggesting no association between the anteroposterior position of the maxilla and the overjet. The SNB angle varied between the three groups because of the position of the mandible in different Class II malocclusions. The palatal plane angle (SN:SPP) was significantly smaller in Group 3 than in Group 1 and the normal occlusion group, indicating an upward inclination of the maxilla with extreme overjet.

Our study is in accordance with Zupancic et al [4] found a positive correlation between overjet and the ANB angle. They indicated that overjet is a good predictor of the ANB angle in subjects with a Class II division 1 malocclusion. Our study is in accordance with Hassan AH [6] who investigated the cephalometric dento-skeletal characteristics associated with Angle's Class II, div 1 malocclusion in Saudi population revealed that Class II div 1 malocclusion sample had specific characteristics like significantly increased ANB angle.

The upper incisors were more proclined in Group 3 as depicted by the UI-SN and UI-palatal plane values and were retroclined in Groups 1. The incisor inclination was in the normal range in Group 2. The position of the upper incisors in the Group 1 were similar to Angle's description of Class II division 2 malocclusion, which stated that the upper incisors are more retroclined in Class II division 2 than in Class II div 1.The mandibular incisors exhibited a normal inclination in Groups 1 and 3 and were proclined in Group 2. The normal inclination in Group 2 might be attributed to dentoalveolar compensation in response to mandibular retrusion in Group 2.

Our study is in accordance with Biljana D et al [7] who studied by utilizing the data for jaw skeletal variations and maxillary and mandibular position according to cranial base in individuals with Class II Division 1 malocclusion, as well as their length showed that the maxilla was in retro-position most frequently, rarely in ante-position and non frequently in normo-position. The mandible was most frequently in retro-position.

Our study is inconsistent with Nita Kumari Bhateja et al [8] described vertical facial morphology in untreated orthodontic patients with Class II division 1 malocclusion. Patients with Class II division 1 malocclusion have an average vertical growth pattern, Overjet value is not a predictor of vertical facial morphology, There is no significant correlation between overjet and parameters used to assess vertical facial morphology.

Our study is inconsistent with I Ioannidou 1, E Gianniou, T Koutsikou, G Kolokithas which showed the overjet measures were equally distributed among men and women, but overbite was higher in women. Facial proportions were also bigger in men, but the Mediterranean face was bigger than Northern American Caucasian. The mandibular plane angle could be associated with either increased or decreased overjet and overbite.The overbite and overjet features of an occlusion cannot be predictably associated with any particular craniofacial pattern.[15]

The contradiction between the findings of this study and the findings of some previous studies might be due to the ethnicity, gender, age, size, and division of the study sample.

VI. CONCLUSION

An association was found between the overjet value and the tendency toward a hyperdivergent pattern. As the overjet increased, mandibular plane angle (S-N:Go-Me), palatal plane to mandibular plane (SPP:Go-Me), Sum (Bjork), Y-axis angle and Lower gonial angle (N Go Me) tended to increase and Jarabak ratio (S-Go/N-Me), Ramal length Ar-Go tended to decrease.

Subjects with a normal overjet showed a horizontal facial pattern and a posterior inclination of the maxilla, whereas increased overjet subjects exhibited a neutral facial pattern with proclined lower incisors. In contrast, subjects with an extreme overjet had a vertical facial pattern, anterior inclination of the maxilla, and a short mandibular ramus.

The mandible was retrognathic and the maxilla was normally positioned in the three groups

VII.CLINICAL IMPLICATIONS

Factors that influence measurement of ANB include a number of sagittal and vertical parameters: facial prognathism, age, and the growth rotation of the jaws in relation to the cranial reference planes. The amount of rotation is greatly related to the facial pattern of the individual.

The mean values are higher for dolichofacial in comparison with mesiofacial and brachyfacial facial types, but facial type does not have an influence on the correlation between parameters. Care should be taken while treating patients with dolichofacial patterns, since orthodontic mechanics tends to open the bite.Adequate measures should be taken to control the vertical dimension and avoid molar extrusion when treating these cases compared with increased and normal overjet cases. Since patients with extreme overjet has vertical tendency, mechanotherapy in these patients should be emphasized on the absolute intrusion of upper and lower anterior teeth. Vertical anchorage loss of molars should also be considered alongside with saggital anchorage.

The earlier use of functional appliances in Class II div 1 malocclusion reduces the overjet, which helps in the earlier correction of saggital malrelationship before commencing the fixed mechanotherapy.Class II div 2 is usually associated with a reduced anterior facial height and a horizontal growth vector, which are indications of an anterior growth rotation and a skeletal deep bite in these individuals. Bite opening is difficult in these patients. The extraction of teeth should be avoided in lower arch because of difficulty of closure of extraction spaces. Also, molar extrusion is difficult in these cases because of more horizontal pull of the masticatory muscles.Class II div 2 should be considered as a separate entity, which differs in almost all of its skeletal and dental features from Class I and Class II div 1. Class II skeletal pattern and reduced interincisal angle were common features of Class II div 1 malocclusion while Class II skeletal pattern, increased interincisal angle, and skeletal deep bite were common features of Class II div 2 malocclusion.

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