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Inheritance of Bimaxillary Dentoalveolar Proclination: A Familial Study

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ABSTRACT

Background: The objective of the present study was to evaluate the correlation significance of inheritance of Bimaxillary dentoalveolar protrusion among parents and children. The sample included were 30 young adults (15 males, 15 females) between the age group 16 to 25 years having bimaxillary dentoalveolar proclination and having both the parents. All the required records were made for the study sample such as lateral cephalogram, photographs, alginate impressions. The results showed that the boys had negative correlation with their fathers in inheriting maxilla (-0.6),positive correlation with their father's in lower incisor placement (0.7).

Keywords: Bimaxillary Dentoalveolar Proclination, Inheritance, Correlations.

INTRODUCTION

"Beauty" captivates the eye of an individual. Many people with different malocclusions wants to improve their facial appearance, and to what extent the appearance of the children simulate parents depends upon the inheritance of triats. One such commonly encountered socially handicapping malocclusion with negative perception is Bimaxillary dentoalveolar protrusion. The term "Bimaxillary Protrusion" was used as early as 1897 by Dr. Calvin C. Case[1]. It is one of the most prevalent dentofacial deformities in the Asian[2] population. It is a condition characterized by protrusive and proclined upper and lower incisors and an increased procumbency of the lips. Other features of patients presenting with bimaxillary protrusion are convex profile, decreased nasolabial angle, gummy smile, mentalis strain, incompetent lips and sometimes anterior open bite. The aetiology of this problem is multifactorial which consists of genetic as well as environmental components[3]. The key to the determination of its treatability lies in the ability to differentiate this malocclusion in terms of inheritance and/or environmental influences. The prevailing opinion among orthodontists on the relative importance of nature and nurture is probably similar to the statement by Harris[4] that "most malocclusions are the direct result of heredity."

There is paucity of information in the literature in terms of the overall presentation of this malocclusion. However, on one of the few studies of its kind Bills[3] mentioned the role of heredity and environment in causing this malocclusion and developed cephalometric standards for bimaxillary protrusion in an ethnically diverse sample, .Keating[5] used cephalometrics to determine the morphological features of this malocclusion. Various other studies (Dandajena[6] Hussein[7], Lamberton[8],) were done to find out the prevelance of this malocclusion in various populations. The morphologic and cephalometric standards of this

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Fig 1: A family included in the study.

Table 1: Correlation of Girls parameters with their parents.

SNO	PARAMETER (Girls)	PEARSON CORRELATION WITH Father	P VALUE	PEARSON CORRELATION WITH Mother	P VALUE
1	SNA	-.351	.199	.746**	.001
2.	SNB	-.170	.544	.750**	.001
3.	ANB	.175	.532	.282	.308
4.	MPA	-.203	.505	.261	.347
5.	U1-NA	-.197	.483	.213	.445
6.	U1-NA	-.428	.165	.061	.830
7.	L1-NB	.021	.940	.323	.240
8.	L1-NB	.707*	.010	.384	.157
9.	U1-L1	.058	.850	.249	.371
10.	U1-SN	-.227	.436	.008	.977
11.	L1-MP	.170	.562	-.255	.359
12.	TTSPA	.038	.893	.259	.372
13.	TSTA	-.380	.180	.310	.261
14.	FA	-.199	.477	-.268	.335

15.	NSLA	.322	.242	.308	.263
16.	LP-U	.150	.593	.050	.860
17.	LP-L	-.361	.187	.387	.154
18.	LP-EP-U	.548*	.034	.100	.723
19.	LP-EP-L	.121	.668	.477	.072
20.	ICW-MX	.069	.815	.450	.093
21.	IMW-MX	.127	.727	.502	.067
22.	ICW-MD	-.049	.868	.296	.285
23.	IMW-MD	-.188	.538	-.285	.396

Table 2: Correlation of Boys parameters with their parents.

SNO	PARAMETER (BOYS)	PEARSON CORRELATION WITH Father	P VALUE	PEARSON CORRELATION WITH Mother	P VALUE
1	SNA	-0.690	0.004	-.225	0.419
2.	SNB	-.306	.267	0.226	0.418
3.	ANB	.298	.280	-.295	.286
4.	MPA	.116	.681	-.137	.625
5.	U1-NA	.015	.958	-.365	.181
6.	U1-NA	.146	.604	.174	.535
7.	L1-NB	.422	.117	.513	.050
12	STPA	.450	.093	-.421	.118
13.	TTPA	-.081	.774	-.388	.153
14.	FA	-.081	.774	.030	.915
15.	NSLA	.522*	.046	-.001	.997
16	LP-U	.126	.655	-.427	.112
17.	LP-L	-.204	.467	.048	.864
18.	LP-EP-U	-.204	.467	-.153	.586
19.	LP-EP-L	-.374	.169	.033	.908
20	ICW-MX	.382	.177	.033	.908
21.	IMW-MX	.298	.300	.100	.723
22.	ICW-MD	.343	.230	.279	.314
23.	IMW-MD	.656*	.011	.377	.166

malocclusion has been studied, but the inheritance of this malocclusion has not yet been studied.

One of the methods to investigate the role of heritability in determining craniofacial and dental morphology is by Familial study[9]. Presently, no data has been reported in available English literature investigating the heritability of bimaxillary protrusion .Cephalometrics parameters are used in the present study to determine the inheritance.

MATERIAL & METHODS

30 young adults, 15 males and 15 females between the age group 16 to 25 years were selected from the Department of Orthodontics, Panineeya Dental College, Hyderabad. Patient's and their parents were explained and requested to participate in the present study .

Inclusion criteria were each patient having both the parents for obtaining records. diagnosed with skeletal class I base based on ANB angle $2+2^0$, Angle's class I molar relationship confirmed by clinical examination, normodivergent growth pattern confirmed by SN-MP $30 -32^0$ **.**

Exclusion criteria: Patient's whose parent's had all anterior teeth missing**,,** patient's parents with severe periodontitis, patient's who had previous history orthodontic treatment, patient's with craniofacial anomalies, patients having bimaxillary dentoalveolar proclination associated with habits. Lateral cephalograms of the patient and their parents were taken along with photographs. Upper and lower alginate impressions were made.

STATISTICAL TEST: The statistical tests used in this study is Pearson correlation to check the inheritance.

RESULT

Correlating patients values to their parents:

The various cephalometric variables, Intercanine and molar widths of the parents and children were correlated to find the inheritance. The correlations were assessed using cephalometric parameters of the parents and their children.

Correlations of skeletal parameters:

The correlations showed that boys showed negative correlation in inheriting the parameter SNB which was statistically significant (0.04) (table II). Single parent data on regression analysis indicated greater contribution from father's. In girls, SNA, SNB showed positive correlation with their mother's which was statistically significant (0.001) (table I).

Correlations of dental parameters: The data obtained shows that among boys U1-SN was positively correlated with their father's, L1-NB was positively correlated with their mother's which was statistically significant (table II)

Among girls L1-NB was positively correlated with their father's and was statistically significant. On considering the regression data, father's contribution to this parameter was greater among girls.(table I)

Correlations of Angular and soft tissue parameters: Of all the angular soft tissue parameters, among boys STPA and NSLA showed positive correlations with their father's and was statistically significant.(table II) Among the linear measurements LP-EP-U was statistically significant among girls and single parent data indicate increased correlation with father's.(table I)

Correlations of Arch width: Mandibular intermolar width was statistically significant among the boy with greater contribution from fathers and there was a positive correlation of intercanine width with their father's.(table II)

Intercanine width among the girls was positively correlated with their mother's.(table I)

DISCUSSION

Bimaxillary dentoalveolar protrusion is one of the most commonly encountered malocclusion in Asian population and specifically in South Indians. A common observation associated with this malocclusion was that parents of the patients also had similar dental condition. Based on this observation, the present study was designed to determine the inheritance of Bimaxillary dentoalveolar protrusion from parents to offsprings, as such a study has not been reported in the English literature. The results suggests that

there may be a strong genetic association of these parameters from parentss to their children.

Skeletal Parameters:

SNA showed negative correlation among the boys (Table II)with their fathers indicating that the boys did not inherit SNA, and the inheritance of this triat is further to be studied. In girls, SNA and SNB are positively correlated with their mothers (Table I). On considering single parent data, mother's contribution to these parameters was greater substantiating the above mentioned. This result suggests that there may be a strong genetic association of these parameters from mothers to their children It has been documented that measurements of the skeletal craniofacial complex have moderate to high heritability's[9]. Numerous studies have examined the genetic contribution to craniofacial similarities among family members, while others have similarly assessed occlusal variation mentioned earlier.

Dental parameters:

U1-SN is significant among the boys showing positive correlation with their fathers and LI-NB was positively correlated with their mothers. Among girls L1-NB was positively correlated with their fathers (table I)and was highly statistically significant. Among girls LI-NB inherited from their parents with strong association from their fathers .U1-SN showed greater contribution from their fathers. In the present study, both the mother-offspring and the father-offspring correlations for these variables showed some genetic effect. There is, substantial confirmation that if genetic effects are present on these attributes, heredity is relatively most important for U1-SN and L1-MP and of minimal importance for other attributes like UI-NA and U1-L1.

Soft tissue angular parameters:

Of all the angular soft tissue parameters among boys Soft tissue profile angle and Nasolabial angle showed positive correlations with their fathers and among girls none of the value showed any correlation with their parents. So far, craniofacial and occlusal variables were studied, but the correlation of soft tissues with the parents was not evaluated. This indicates children may inherit some of the soft tissue traits from their parents.

Soft tissue linear parameters:

Linear parameters showed no correlations among boys with their parents. Among girls, upper lip protrusion with EP was correlated with fathers among the girls. This indicates that some of the parameters among the girls are inherited from their fathers.

Archwidth Parameters:

Mandibular intermolar width was positively correlated among the boy with their fathers. Intercanine and intermolar widths among the girls showed positive correlation with their mothers.

CONCLUSION

The number of correlations were greater for females indicating that girls inherited more characteristics from their parents and particularly the skeletal characteristics were inherited from the mother. Father's contribution, among the girls was seen in transmission of dental triats.

Among males, the contribution of inherited traits from their fathers was greater. Further study in a larger population to identify the genes and transmission of this particular malocclusion would substantiate this study.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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