ejpmr, 2017,4(6), 609-618

SJIF Impact Factor 4.161

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

COMPARATIVE EVALUATION OF FACIAL SOFT TISSUE CHARACTERISTICS INHERITED BETWEEN PARENTS AND OFFSPRING – A PHOTOGRAPHIC STUDY IN KALABURGI FAMILIES

B.C Patil[1], Anjali Vairage*[2], Vishwanath Patil[3], M.Suresh[4], Naaz Anjum[5], Fazal Ur Rahman[6], Abdul Malik[7]

[1]Professor Dept of Orthodontics Hke S Nijalingappa Institute of Dental Science Kalaburgi, Rguhs Bangalore.
[2]Post Graduate Student, Dept of Orthodontics Hke S Nijalingappa Institute of Dental Science Kalaburgi, Rguhs Bangalore.
[3]Prof and HOD Dept of Orthodontics, Hke S Nijalingappa Institute of Dental Science Kalaburgi, Rguhs Bangalore.
[4]MDS, Private Practitioner, Hyderbad Telangana.
[5,6,7]Post Graduate Student, Dept of Orthodontics Hke S Nijalingappa Institute of Dental Science Kalaburgi,Rguhs Bangalore.

***Corresponding Author: Dr. Anjali Vairage**

Post Graduate Student, Dept of Orthodontics Hke S Nijalingappa Institute of Dental Science Kalaburgi, Rguhs Bangalore.

Article Received on 15/04/2017 **Article Revised on 06/05/2017** **Article Accepted on 27/05/2017**

ABSTRACT

Introduction: Face prediction based on genetic profiling, if feasible, may revolutionize forensics and strongly benefit medical diagnosis. A better understanding of the relative genetic influence on dento-facial and occlusal parameters would improve our knowledge of the etiology of orthodontic disorders, possibilities and limitations of orthodontic treatment and treatment planning. **Aims and objectives:** The purpose of this study is to investigate the heritability of soft tissue pattern between parents and their offspring both frontal and lateral photographic analysis based on correlation between measurements of areas and distance between features of parents and offspring. **Material and methods:** standard photographs taken in frontal and lateral photographs in an natural head position 120 subjects were taken from 30 families from Gulbarga population. tracing was done of the true life size measurements were obtained and correlation between parent –offspring group were analyzed. Statistical analysis was done by applying student t test. **Results:** results indicate that there lies a high correlation between mother and daughter and father and son group with some parameters being moderately correlated in opposite sex group. Daughter being affected by both the parents with strong correlation found in mother-offspring group. **Conclusion:** This study gave an indication regarding the fair genetic control in the transmission of soft tissue facial characteristics and consideration of the same can be done in prediction of growth and treatment planning in orthodontic practice in future.

KEYWORDS: Heritability, photography, soft tissue, parents-offspring.

INTRODUCTION

By harbouring the vital sensory organs, the human face acts like a canvas for expressions, beauty, recognition and communication, plays an important role in day to day life. The quest to understand the inheritance of facial characteristic in generations i.e parents to off springs, started from Mendelian era is still a fascinating question to the scientific fraternity .The various researches conducted among racial groups, siblings and famous twin studies have unveiled the high heritability of human facial morphology.[1]

As it is known, the skeletal inter jaw relationship, morphology of tooth and malocclusion variables are hereditary and affect the development and establishment of occlusion in an individual. Some authors even suggestively claim that parental data is more competent in prediction of growth prospects of a child's future craniofacial form than growth curves.[2,3]

Many researchers have investigated parent's genetic influence's on their children's skeletal craniofacial forms using traditional roentgenographic cephalometrics.[4-10] But it has its own disadvantages as not feasible for large scale study, technique sensitive, cost effectiveness and radiation exposure. Also, treatment based on cephalometric hard tissue diagnosis may create undesirable facial change depending on which method of cephalometric analysis is used.[11-13]

Therefore this gives a call for low budget and efficient technique to assess craniofacial morphology. Facial photography, one of the essential diagnostic tools, has been part of both pretreatment and post treatment

orthodontic records, it provides a unique way to study facial growth.[11,14-17]

The purpose of this study was to investigate the heritability of soft tissue pattern between parents and their offspring both frontal and lateral photographic analysis based on correlation between measurements of areas and distance between features of parents and offspring in Kalaburgi population.

MATERIALS AND METHODS

The study was conducted in Department Of Orthodontics And Dentofacial Orthopedics, HKESS. Nijalingappa Institute of Dental Science And Research, Kalaburagi.

ARMAMENTARIUM

1. Digital SLR camera { canon d 700}
2. Tracing paper
3. 0.3mm pencil.
4. metal rulers.
5. 120 subjects were taken from 30 families from Kalaburgi population.

1. Inclusion criteria

- Father ,mother ,son and daughter in a family
- Children above the age of 16 years.

2. Exclusion criteria

- ·Any family member had ever undergone any orthodontic or surgical treatment /wear complete or partial denture were not included.
- Congenital anomalies like cleft lip, Down syndrome were not included.
- Family in which there was consanguineous marriage between parents

METHOD

Subjects were made to relax, standard photographs taken in frontal and lateral photographs in natural head position, with metal scales oriented in relation to FH plane /parallel to the floor and perpendicular to each other on lateral profile and parallel to inter-pupillary line for frontal photographs. (Fig 1&2).

Fig 1 and 2

Photographic Set Up –the photographic set up consist of a tripod stand supporting a mounted digital camera.

Distance of subject from camera – 1.5 meter; Focal length -55mm.

Natural head position - A mirror was placed in front of the subject at a distance ,subject was told to look in their eyes in the mirror. points were identified on photograph .(fig 3&4).

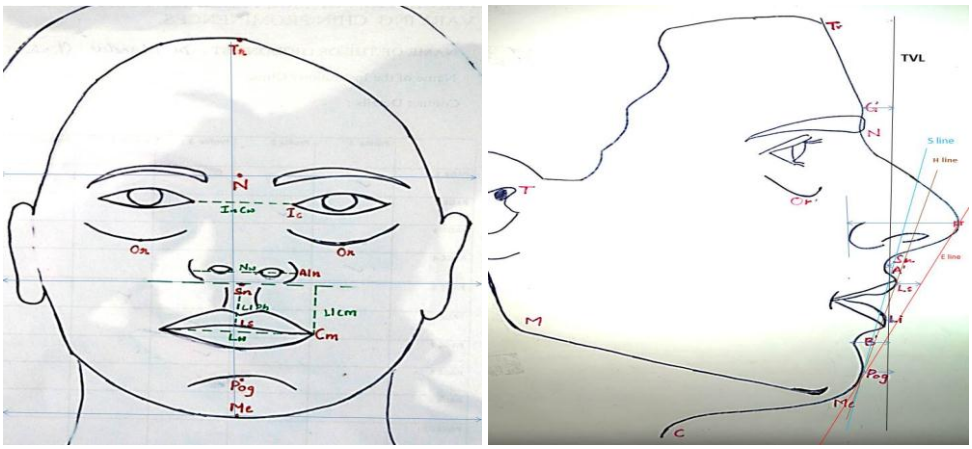

Fig 3 and 4

The values were calculated from the photographs with the help of metal ruler allowing direct measurement at life size.

RESULTS

Subjects were paired as father –mother, father-son, mother- son, father – daughter, mother- daughter and son-daughter of respective family and student t-test was applied. Using the values obtained the Arithmetic mean; standard deviation and correlation analysis were calculated for each group. The statistical significance was calculated with the help of student t test.(/TABLE - 1, TABLE 2-ATABLE 2-B, TABLE 3-A,TABLE 3-B and TABLE 4.

The probability values were considered as following:

P value Significance

<0.01 Highly Significant

<0.05 Significant

>0.05 Non-significant

FIGURE 5/TABLE 1. COMPARISON AND CORRELATION OF LINER PARAMETERS (IN mm) FATHER –MOTHER GROUP AND SIGNIFICANCE.

	r -value	t-value	p-value	S/NS/HS
UHF	0.065.	1.6783	0.0987	NS
LFH	0.2839	1.357	0.18	NS
TFH	0.472	3.9325	0.0002	S
IcW	-0.3111	1.0932	0.2788	NS
Nw	0.8487	0.4625	0.6455	NS
Lw	-0.0936	0.7461	0.4586	NS
Sn -H line	-0.5964	0.6244	0.5348	NS
Tv-G	-0.3163	0.0031	0.9975	NS
Tv-Tn	-0.1744	1.9114	0.0609	NS
Tv- Sn	0.4223	1.813	0.054	S
Tv-ptA	0.727	0.0033	0.9973	NS
Tv-Ls	-0.067	5.9857	0.06	NS
Tv-ptB	-0.2964	4.3678	0.098	NS
Tv-Li	0.3931	2.4534	0.172	NS
Tv-pog	0.1698	10.309	0.07	NS
chin -ptB	-0.0726	1.4674	0.1477	NS
Ll-ph	-0.0672	2.3015	0.25	NS
Ll-Cm	-0.611	0.6836	0.4969	NS
Lp-Eline-U	-0.6134	1.7004	0.0944	NS
Lp-Eline-L	0.4227	4.5454	0.08	NS
Lp-Sline-U	0.1374	1.6864	0.0971	NS
Lp-Sline-L	0.3536	1.3383	0.186	NS
Np	0.4453	6.5071	0.0834	NS
Vc/Lp	-0.9076	1.828	0.0727	NS

Fig 6/ TABLE 2 A .COMPARISON AND CORRELATION OF LINER PARAMETERS (IN MM) FATHER – SON GROUP AND SIGNIFICANCE

	r -value	t-value	p-value	S/NS/HS
	_	_	_	_
UHF	0.14	0.03	0.48	NS
LFH	0.12	0.6	0.277	NS
TFH	0.25	1.89	0.0312	S
IcW	0.228	5.63	0.0001	HS
Nw	0.378	4.638	0.001	HS
Lw	0.172	1.33	0.1871	NS
Sn -H line	-0.315	0.278	0.781	NS
Tv-G	0.016	4.426	0.00021	HS
Tv-Tn	0.179	0.935	0.176	NS
Tv- Sn	0.08	2.405	0.01	S
Tv-ptA	0.205	0.073	0.436	NS
Tv-Ls	-0.23	0.131	0.896	NS

Tv-ptB	1.976	0.05	0.5	NS
Tv-Li	-0.318	0.304	0.762	NS
Tv-pog	0.71	1.73	0.08	NS
chin -ptB	0.27	0.674	0.251	NS
Ll-ph	0.41	1.46	0.07	NS
Ll-Cm	0.181	1.96	0.026	S
Lp-Eline-U	0.16	0.96	>0.05	NS
Lp-Eline-L	0.264	0.981	0.165	NS
Lp-Sline-U	0.01	0.885	0.189	NS
Lp-Sline-L	0.552	4.096	0.0006	HS
Np	0.2825	1.8419	0.0706	NS
Vc/Lp	0.012	1.5317	0.06	NS

Fig 7/TABLE 2 B .COMPARISON AND CORRELATION OF LINER PARAMETERS (in mm) FATHER – DAUGHTER GROUP AND SIGNIFICANCE

	r -value	**t-value**	**p-value**	**S/NS/HS**
UHF	0.295	1.645	0.052	NS
LFH	0.105	0.966	0.105	NS
TFH	0.259	2.26	0.027	S
IcW	0.254	0.762	0.44	NS
Nw	0.251	0.133	0.899	NS
Lw	0.138	6.714	0.001	HS
Sn -H line	0.27	2.219	0.0304	S
Tv-G	0.37	1.195	0.118	NS
Tv-Tn	0.6514	0.8	0.211	NS
Tv- Sn	0.702	0.171	0.864	NS
Tv-ptA	0.714	1.387	0.085	NS
Tv-Ls	0.38	0.283	0.77	NS
Tv-ptB	1.0075	0.317	0.26	NS
Tv-Li	-0.42	1.504	0.137	NS
Tv-pog	0.415	1.167	0.123	NS
chin -ptB	0.655	0.2651	0.132	NS
Ll-ph	0.579	3.24	0.0009	S
Ll-Cm	0.583	0.459	0.323	NS
Lp-Eline-U	0.537	1.619	0.05	S
Lp-Eline-L	0.209	4.55	0.000014	HS
Lp-Sline-U	0.066	1.983	0.26	S
Lp-Sline-L	0.1438	2.75	0.0077	HS
Np	0.2545	9.6927	0.0001	HS
Vc/Lp	-0.85	0.8014	0.42	NS

Fig 8/TABLE 3 A .COMPARISON AND CORRELATION OF LINER PARAMETERS (IN MM) MOTHER-SON GROUP AND SIGNIFICANCE

	r -value	**t-value**	**p-value**	**S/NS/HS**
	_	_	_	_
UHF	0.0921	1.897	0.03	S
LFH	-0.04	1.78	0.079	NS
TFH	0.39	2.366	0.021	S
IcW	0.375	4.86	0.001	HS
Nw	0.408	1.694	0.095	NS
Lw	0.0287	5.532	0.001	HS
Sn -H line	0.165	0.72	0.236	NS
Tv-G	0.036	3.68	0.002	HS
Tv-Tn	0.101	6.08	0.0001	HS
Tv- Sn	0.101	6.08	0.0001	HS
Tv-ptA	0.259	0.161	0.43	NS
Tv-Ls	0.365	0.131	0.896	NS

Tv-ptB	0.513	0.6	0.23	NS
Tv-Li	0.559	0.304	0.761	NS
Tv-pog	0.226	0.134	0.893	NS
chin -ptB	0.333	1.831	0.036	S
Ll-ph	0.4	1.46	0.073	NS
Ll-Cm	0.071	1.89	0.062	NS
Lp-Eline-U	0.6521	3.143	0.0013	S
Lp-Eline-L	0.238	4.652	0.0001	HS
Lp-Sline-U	0.271	1.99	0.025	S
Lp-Sline-L	0.34	4.44	0.0002	S
Np	0.3407	5.1974	0.0001	S
Vc/Lp	0.059	2.894	0.005	S

Fig 9 /TABLE 3 B .COMPARISON AND CORRELATION OF LINER PARAMETERS (IN MM) MOTHER-DAUGHTER GROUP AND SIGNIFICANCE

	r -value	**t-value**	**p-value**	**S/NS/HS**
UHF	0.65	0.29	0.344	NS
LFH	-0.08	0.41	0.682	NS
TFH	-0.164	2.07	0.042	**S**
IcW	0.263	0.56	0.57	NS
Nw	0.362	1.961	0.05	**S**
Lw	0.396	0.49	0.62	NS
Sn -H line	0.213	1.706	0.046	**S**
Tv-G	0.525	9.25	0.001	**HS**
Tv-Tn	0.11	5.83	0.0001	**HS**
Tv- Sn	0.46	2.97	0.004	**S**
Tv-ptA	0.461	2.15	0.01	**S**
Tv-Ls	0.56	2.271	0.02	**S**
Tv-ptB	0.23	2.69	0.004	**HS**
Tv-Li	0.18	2.74	0.008	**HS**
Tv-pog	0.605	3.744	0.0002	**HS**
chin -ptB	0.235	2.69	0.004	**HS**
Ll-ph	0.57	1.227	0.06	NS
Ll-Cm	0.23	1.392	0.169	NS
Lp-Eline-U	0.721	2.908	0.0025	**S**
Lp-Eline-L	0.28	1.079	0.285	NS
Lp-Sline-U	0.2435	1.37	0.08	NS
Lp-Sline-L	0.302	1.71	0.091	NS
Np	0.0892	0.2109	0.8337	NS
Vc/Lp	0.586	0.372	0.71	NS

Fig: 10/TABLE 4. COMPAR

	r -value	**t-value**	**p-value**	**S/NS/HS**
UHF	-0.312	1.9468	0.0564	NS
LFH	-0.0027	1.4541	0.1513	NS
TFH		0.3606	0.7197	NS
IcW	0.3538	3.0858	0.0031	**S**
Nw	0.7907	5.3398	0.0001	HS
Lw	0.3982	4.5102	0.0001	HS
Sn -H line	0.5324	1.1173	0.2685	NS
Tv-G	0.3549	0.7724	0.443	NS
Tv-Tn	0.091	0.1857	0.8533	NS
Tv- Sn	0.1163	2.5803	0.0124	S
Tv-ptA	-0.0519	1.9682	0.0538	NS
Tv-Ls	0.4206	1.0892	0.2806	NS
Tv-ptB	-0.0921	0	1	NS

Tv-Li	-0.0805	0.0697	0.9446	NS
Tv-pog	0.2772	0.7583	0.4513	NS
chin -ptB	-0.3007	0.3345	0.7392	NS
Ll-ph	0.4597	0.4719	0.6388	NS
Ll-Cm	0.7544	2.645	0.0105	S
Lp-Eline-U	-0.3782	8.399	0.0001	HS
Lp-Eline-L	-0.1418	3.1317	0.0027	S
Lp-Sline-U	0.2102	2.1988	0.0319	S
Lp-Sline-L	0.1517	1.1922	0.238	NS
Np	-0.2859	8.1271	< .00001	HS
Vc/Lp	-0.3057	1.7223	0.0904	NS

ISON AND CORRELATION OF LINER PARAMETERS (IN MM) SON-DAUGHTER GROUP AND SIGNIFICANCE

OBSERVATION

1. Upper facial height: Significant heritability in between mother - son group ($p<0.05$)with similarity seen in father –daughter as near to significant but not statistically significant.

2. Lower facial height: With positive correlation, the heritability was not statistically significant in both the gender group.

3. Total facial height: Showed high heritability to the parents in the both the sexes the similarity of son was found to be more to both parents in comparison to daughters ($p <0.05$)

4. Inner canthus width: Only son showed high heritability from both the parents. However statistically significant association was found between siblings (son and daughter group)

5. Nasal width: The heritability to the parents was seen in both the sexes with similarity being more in same sex group. Its highly significant for father –son ($p<0.01$) in comparison to mother- daughter ($p<0.05$).statistically high significant association was found between siblings(son and daughter group)

6. Lip width: The heritability was observed in opposite sex groups, the similarity was high between father –daughter and significant between mother–son. High significant association was found between siblings(son and daughter group)

7. Soft tissue subnasale to H line: Only daughter showed the inheritance from both the parents while mother –daughter group had more heritability than father- daughter.

8. True vertical to glabella: Son showed high inheritance from both the parents while daughter showed the higher significance only from mother($p<0.01$)

9. True vertical to tip of nose: Heritability was found only to the mother in both the sexes both being highly significant.

10. True vertical to subnasale: Heritability was seen in similar sex group with mother –daughter inheritance being higher than father-son .Also statistically significant association was found between siblings(son and daughter group)

11. True vertical to point A: Significant inheritance was only observed in mother –daughter group($p<0.05$)

12. True vertical to labrale suprerius: Significant similarities were seen in mother –daughter group with other groups being non-significant

13. True vertical to point B: Showed high significant heritability between mother and daughter groups.

14. True vertical to labrale inferius: Significant heritability was found only between mother and daughters group ($p<0.05$).

15. True vertical to pogonion: High heritability was found only between mother–daughter ($p<0.01$).

16. Chin projection: Inheritance was found only to mother for both the sexes, with daughter-mother similarities being higher than son-mother similarity($p<0.05$)

17. Lip length at philtrum: The similarity was observed for the father and daughter group ($p<0.05$) .Though similarity was seen in father –son as near to significant but not statistically significant.

18. Lip length at corner of mouth: The heritability was found only for the fatherson group($p<0.05$).Also statistically significant association was found between siblings(son and daughter group).

19. Upper lip prominence to E line: Heritability was seen of mother in both sexes where as it was seen between father-daughter .The similarity between mother –son was higher than mother-daughter($p<0.05$).Also statistically high significant association was found between siblings (son and daughter group).

20. Lower lip prominence to E line: Inherited from parents in both the sexes, the similarity was significant in opposite gender group with mother-son being higher than father-daughter ($p<0.05$). Also statistically significant

association was found between siblings(son and daughter group).

21. Upper lip prominence to S line: the heritability was found in both the sexes but it was more significant in the opposite gender group and also a significant correlation was seen in between the siblings

22. Lower lip prominence to S line: Son showed heritability to both the parents with father –son similarity being higher than the mother –son group .whereas daughter showed significant heritability to only father.($p<0.01$)

23. Nasal prominence : The heritability was found in both the sexes but it was more significant in the opposite gender group, with father daughter group being higher than the mother –son group. A high significant correlation was observed in between the siblings (son-daughter group). ($p<0.01$).

24. Vertical-chin ratio: The proportional parameter showed significant heritability in between mother-son group($p<0.05$) with similarity seen in father –son as near to significant but not statistically significant.

DISCUSSION

Inheritance plays a significant role in the determination of craniofacial morphology'. Such a conclusion is based on cephalometric and anthropometric comparative studies conducted among triplets, between twins(monozygotic and dizygotic), among siblings, and between parents and their offspring.**[18]** These studies where mainly based on taking hard tissue into consideration, there are relatively less number of studies which have taken genetic transmission of soft tissue characteristics in to account.

Studies conducted by Nakata et al[22], Nakasima and Ichinose[23], Suzuki and Takahama[3], Aksakalli et al[13] and Gelgor et al[24] have tried to explain the importance and application of parental data for in orthodontic diagnosis, case assessment, and treatment planning.

As described by Kohn, in order to estimate the effect of inheritance upon variation in craniofacial morphology, one must be able to model craniofacial morphology and define the traits to be measured (distances between landmarks or as the location of Landmarks).[18] Riveiro et al determined the linear and angular measurements that define the average soft tissue profile of young adults using a standardized photogrammetric analysis of the profile in NHP.[25,26] There are many authors who described photography as an important for diagnostic & treatment planning procedure as it is low cost & less technique sensitive and can be used reliably for epidemiological purpose, research, screening , initial consultations,& case were irradiation are contraindicated. Though they also commended that cephalometrics & photographs cannot be used interchangeably since they measure different aspects of craniofacial morphology, photography assumes equal importance as an essential diagnostic aid as there is paradigm shift towards the soft tissue in orthodontic treatment planning.[11,14,16,17] There are many photographic studies conducted with the help of standardized photographic technique in order to analyze the various linear & angular parameters, proportions and even appreciation of resemblance in first degree relatives, justifying the use of standardized photographic technique as reliable tool for analysis at a large scale.[27-28]

This study was conducted with the purpose to compare and co-relate the heritability of soft tissue pattern of parents and their offspring's with the help of linear parameters calculated on frontal and profile photographs taken in natural head position ,with oriented metal ruler in order to calculate direct life size measurements. 24 linear parameters were selected including one proportional measurement which are said to be having more genetic determination than angular measurements described by Nakata et al[22]

In the linear measurements of the anterior facial heights, the upper facial height showed significant heritability in between mother - son group only; our results were in contrast to the similar study done by Lahoti et al[20] which showed no heritability in any parent- offspring group for the same. The lower facial height showed no heritability in any parent –offspring group which were similar to the study conducted by Hyun-Jin Kim et al[19] and Lahoti et al.[20] But studies like that of Tina and Eman[10] suggest that the lower facial height had more heritability that the upper facial height though this also could be attributed to the fact that this studies where cephalometric studies and the landmarks were skeletal rather than soft tissue landmarks. The total facial height showed significant correlation between all the parents – offspring group with similarities being more in parent – son group to that of daughters. It agreed with the study done by Nakisama and Ichinose[23] and also Johannsdottir et al8 though in relation to younger age group. Our study agreed to the results of Hunter et al4 except in our study there was significant correlation between father –son group as well. The results were in contrast to the similar photographic study of Lahoti et al[20] which only showed significant correlation between father –son group and father – mother groups.

In the frontal photograph measurements, the inner canthus width and nasal width results were found to be similar to the results of the study of Hyun-Jin Kim et al[19] and Lahoti et al[20] showing significant genetic correlation. For lip width the heritability was observed in opposite sex groups, the similarity was high between father –daughter and significant between mothers –sons. High significant association was found between siblings. Which was in contrast to the results of Hyun-Jin Kim et al[19] and Lahoti et al[25] which showed no heritability of parent off-spring group. The lip length at philtrum and

corner of the mouth showed similarity in father – daughter group and father and son group respectively. Whereas a same sex co-relation was seen in the previous similar study.[19,20]

The measurements of lateral profile photographs calculated in relation to true vertical line showed high correlation between mother – daughter groups agreeing with the findings of Lahoti et al[20] also with true vertical to glabella and subnasale showed significant correlation between father-son groups. High correlation was found between parents –daughter group in relation to soft tissue subnasale to H line were as in the studies conducted by and Lahoti et al[20] and Gelgor et al[24] showed high heritability to parents in both sexes .For nasal prominence the heritability was found in both the sexes but it was more significant in the opposite gender group, with father daughter group being higher than the mother –son group. As in study of Gelgor et al[24] it showed high heritability to the parents. A significant correlation was found in mother –offspring group in Lahoti et al study. The chin projection inheritance was found only to mother for both the sexes, with daughter mother similarities being higher than son-mother similarity same as similar study results.[20]

The parameter in relation with E line the upper lip heritability was seen of mother in both sexes where as it was seen between father-daughter. The lower lip to E line showed inheritance from parents in both the sexes, the similarity was significant in opposite gender group with mother-son being higher than father-daughter. Vertical lip-chin ratio the proportional parameter showed significant heritability in between mother - son group agreeing with study done by Manfredietal21. Findings of our study agreed with the other genetic studies of Hunter et al[4], Sukuzi et al[6], Johannsdottir et al[8],Mehta et al[9], Aksakalli et al[13], Kim et al[19],Lahoti et al[20],chang et al[21],Nakata et al[22] , Gelgor et al[24] with all the parameters of the offspring resembling either one of the parent, as Suzuki and takahama[6] stated "the face of the offspring often resembles that of at least one of the his or her parents".

In this study the mother –off spring group had more similarities than the father –offspring group, in which the mother –daughter and mother –son group has almost equally influenced. In the father-offspring group the father –daughter group high correlation than the father-son group Which agreed with the results of Sukuzi et a l6 ,Gelgor and Zekic et al[24], Mehta and Gupta9, Lahoti et al[20] who state that most of the characteristics are transferred from mother to the offspring and daughter receives characteristics from both the parents. In contrast the previous genetic studies such as Staurt Hunter4 showed stronger correlation in father – offspring group.

SUMMARY AND CONCLUSION

A better understanding of the relative genetic influence on dento-facial and occlusal parameters would improve our knowledge of the etiology of orthodontic disorders, possibilities and limitations of orthodontic treatment and treatment planning.

The purpose of this study was to investigate the heritability of soft tissue pattern between parents and their offspring both frontal and lateral photographic analysis based on correlation between measurements of areas and distance between features of parents and offspring in a Kalaburgi population. This study gave an indication regarding the fair genetic control in the transmission of soft tissue facial characteristics and consideration of the same can be done in prediction of growth and treatment planning in orthodontic practice in future .Our results indicate that there lies a high correlation between mother and daughter and father and son group with some parameters being moderately correlated in opposite sex group. Daughter being affected by both the parents with strong correlation found in mother-offspring group. Our study also suggests photography can be used as a reliable technique for acquiring data of soft tissue facial profiles when taken in a standardized method and proper head posture. For more dependent conclusive results it is recommended for larger sample size with selection of parameters which showed high correlation in previous genetic study and computerized photometric analysis when feasible

REFERENCES

1. Peng S, Tan J, Hu S, Zhou H, Guo J, Jin L et al. Detecting Genetic Association of Common Human Facial Morphological Variation Using High Density 3D Image Registration. P LoS Comput Biol., 2013; 9(12): e1003375.
2. Harris EJohnson M. Heritability of craniometric and occlusal variables: A longitudinal sib analysis. American Journal of Orthodontics and Dentofacial Orthopedics, 1991; 99(3): 258-268.
3. Suzuki ATakahama Y. Parental data used to predict growth of craniofacial form. American Journal of Orthodontics and Dentofacial Orthopedics, 1991; 99(2): 107-121.
4. Hunter W, Balbach D, Lamphiear D. The heritability of attained growth in the human face. American Journal of Orthodontics, 1970; 58(2): 128-134.
5. Nakasima A, Ichinose M, Nakata S, Takahama Y. Hereditary factors in the craniofacial morphology of Angle's Class II and Class III malocclusions. American Journal of Orthodontics, 1982; 82(2): 150-156.
6. Lundstrom. A McWilliam J. A comparison of vertical and horizontal cephalometric variables with regard to heritability. The European Journal of Orthodontics, 1987; 9(1): 104-108.
7. Suzuki A, Takahama YA cephalometric study on the similarity of craniofacial morphology between children and their parents. Nihon Kyosei Shika Gakkai Zasshi, Dec, 1988; 47(4): 697-719.
8. Johannsdottir B, Thorarinsson F, Thordarson A, Magnusson T. Heritability of craniofacial

characteristics between parents and offspring estimated from lateral cephalograms. American Journal of Orthodontics and Dentofacial Orthopedics, 2005; 127(2): 200-207.
9. Mehta O, Gupta D. A study of cephalometric appraisal of the inheritance of craniofacial pattern in Gorkhas. Journal of Indian Society of Pedodontics and Preventive Dentistry, 2008; 26(3): 121.
10. Al-Khudhairi TAlKofide E. Cephalometric craniofacial features in Saudi parents and their offspring. The Angle Orthodontist, 2010; 80(6): 1010-1017.
11. Zhang X, Hans M, Graham G, Kirchner H, Redline S. Correlations between cephalometric and facial photographic measurements of craniofacial form. American Journal of Orthodontics and Dentofacial Orthopedics, 2007; 131(1): 67-71.
12. Arnett, et al., The International Journal of Adult Orthodontics & Orthognathic Surgery, 1998; 13: 4, Quintessence Publishing Co., Inc.
13. Aksakalli SDemir A. The Comparison of Facial Estethics between Orthodontically Treated Patients and Their Parents. The Scientific World Journal, 2013; 2013: 1-7.
14. Guyot L, Dubuc M, Richard O, Philip N, Dutour O. Comparison between direct clinical and digital photogrammetric measurements in patients with 22q11 microdeletion. International Journal of Oral and Maxillofacial Surgery, 2003; 32(3): 246-252.
15. Dimaggio F, Ciusa V, Sforza C, Ferrario V. Photographic soft-tissue profile analysis in children at 6 years of age. American Journal of Orthodontics and Dentofacial Orthopedics, 2007; 132(4): 475-480.
16. Trivedi RPatel D. Photography versus lateral cephalogram: Role in facial diagnosis. Indian Journal of Dental Research, 2013; 24(5): 587.
17. de Carvalho Rosas Gomes L, Horta K, Gandini L, Gonçalves M, Gonçalves J. Photographic assessment of cephalometric measurements. The Angle Orthodontist, 2013; 83(6): 1049-1058.
18. Kohn, L. The Role of Genetics in Craniofacial Morphology and Growth. *Annual Review of Anthropology, 1991; 20*: 261-278. Retrieved from http://www.jstor.org/stable/2155802
19. Kim HJ, Im SW, Jargal G, Lee S, Yi JH, Park JY, Sung J, Cho SI, Kim JY, Kim JI, Seo JS. Heritabilities of facial measurements and their latent factors in Korean families. Genomics & informatics, Jun 1, 2013; 11(2): 83-92.
20. Lahoti SK, Karia AM, Lahoti KB. Heritability of Facial Characteristics between Parents and Offsprings: A Photographic Study. Journal of Indian Orthodontic Society, Dec 1, 2013; 47(8): 419.
21. Chang CH, Miyazono H, Komiya T, Nakasima A. The similarity between parents and offspring in facial soft tissue: A frontal-view study. Australian orthodontic journal, Mar, 1998; 15(2): 85.
22. Nakata M, Yu PI, Davis B, Nance WE. The use of genetic data in the prediction of craniofacial dimensions. American journal of orthodontics, May 31, 1973; 63(5): 471-80.
23. Nakasima A, Ichinose M. Role of parental variables in predicting facial growth after treatment of anterior crossbite. American Journal of Orthodontics and Dentofacial Orthopedics, Dec 31, 1986; 90(6): 492-500.
24. Gelgör IE, Karaman AI, Zekiç E. The use of parental data to evaluate soft tissues in an Anatolian Turkish population according to Holdaway soft tissue norms. American Journal of Orthodontics and Dentofacial Orthopedics, Mar 31, 2006; 129(3): 330-e1.
25. Peerlings RH, Kuijpers-Jagtman AM, Hoeksma JB. A photographic scale to measure facial aesthetics. The European Journal of Orthodontics, Apr 1, 1995; 17(2): 101-9.
26. Fernández-Riveiro P, Suárez-Quintanilla D, Smyth-Chamosa E, Suárez-Cunqueiro M. Linear photogrammetric analysis of the soft tissue facial profile. American Journal of orthodontics and Dentofacial orthopedics, Jul 31, 2002; 122(1): 59-66.
27. Fernández-Riveiro P, Smyth-Chamosa E, Suárez-Quintanilla D, Suárez-Cunqueiro M. Angular photogrammetric analysis of the soft tissue facial profile. The European Journal of Orthodontics, Aug 1, 2003; 25(4): 393-9.
28. Morosini ID, Peron AP, Correia KR, Moresca R. Study of face pleasantness using facial analysis in standardized frontal photographs. Dental Press Journal of Orthodontics, Oct, 2012; 17(5): 24-34.
29. Tripathi AA, Tandon RP, Hantodkar N. Facial divine proportions in attractive North Indian females: A photographic study. World Journal of Dentistry, Jan 8, 2013; 4(1): 41-6.
30. Osunwoke EA, Omin E. Photometric facial analysis of soft tissue profile of Okrika adults. Annual Research & Review in Biology, Jun 15, 2014; 4(12): 1980.
31. Osunwoke EA, Onyeriodo G. Angular photometric analysis of Khana people in Rivers State, Nigeria. Trans Clin Bio., May, 2014; 2(1).
32. Moshkelgosha V, Fathinejad S, Pakizeh Z, Shamsa M, Golkari A. Photographic Facial Soft Tissue Analysis by Means of Linear and Angular Measurements in an Adolescent Persian Population. The open dentistry journal, 2015; 9: 346.
33. Chokshi H, Baswaraj H, Tandur AP, Agrawal C, Mahida K, Patel B. Soft tissue facial profile analysis using linear photogrammetric analysis in North Gujarat population. International Journal of Contemporary Dentistry. May 13, 2015; 6.
34. Bhandari V, Singla A, Mahajan V, Jaj HS, Saini SS. Soft tissue facial profile in Himachal population: A photogrammetric analysis. Indian Journal of Dental Research, Sep 1, 2015; 26(5): 469.
35. K S Singh et al. A Photographic Analysis of the Soft Tissue Facial Profile in Assamese Population.

International Journal of Pharma Research and Health Sciences, 2016; 4(1): 998-1003.