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The Study of Linear Parameters with Facial Photographic Analysis of Punjabi Female Population

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Abstract:
Introduction*: Attraction towards a beautiful face is one of the basic characteristics of human beings. Aesthetic varies according to race,nation,individuals.Balance and harmony of various dentofacial components have been regarded as key of aesthetic.Photography is the real image of human face.So, this study aims to establish the norms of photographic parameters of Punjabi female population and compare it with other races.*
Material and method:*The study is based on Photographic analysis female population who stay in West Bengal.So subjects were selected between age group of 18-25 years.Samples fulfill bilateral angle class-1 molar relation with normal overjet and overbite with full complement of teeth.More or less bilateral symmetrical face and straight profile with no history of previous orthodontic treatment.*
Standardized frontal and profile photographs were taken in NHP.In frontal view inter pupillary line was kept parallel to the floor.Same camera,lens and distance were maintained.All the photographs were traced for analysis by using 0.003" acetate matte tracing paper and 3H pencil.Only linear parameters were taken.
Result and analysis:*All the values were statistically analyzed.All samples are asymmetrical, there are significant difference of alar width to intercanthal width from Canadian and North European origin,result is same in case of mouth width to medial irises width and intercanthal width of right and left side.There are significant difference in mid face height to lower face height to lower face height ratio,lower face is longer and facial index,but upper lip and lower lip height is same.Lips and chin are less prominent than normal caucasion, but both the lips are protrusive in relation to the E-line and sulcus depth is less in compare to the caucation,but less protrusive than negro and chinese females.*
Conclusion – *It can be concluded that Punjabi female subject of this study differ from other races, however similarities are noticed in respect to some parameter. This suggests that though there are ethnic variation ,but human being as a race have commonaties also.*

Keywords- *Comparision, Esthetics,Linear parameters, Photographic analysis.*

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I. INTRODUCTION

Man has a long esthetic heritage. They perhaps subconsciously have been aware of beauty for a long time, especially in the recent modern civilized society, esthetic is a dominant feature. Attraction towards a beautiful face is one of the basic instinct of human beings. Though esthetic varies according to nation , race and individuals. Balance and harmony of various dento-facial components have been regarded as the key of esthetic. Doctor E. H. Angle was one of the first campaigner, stressed about facial harmony and beauty.Greek philosopher Aristotle and Plato felt that beautiful creations respected certain geometrical laws and that true beauty displayed balance and harmony.After long years Robert M. Ricketts suggested that "esthetic can indeed be described scientifically.He suggested the key of esthetic is the divine proportion of 1.618.Event today esthetic is the major concern of the orthodontist as well as the person seeking orthodontic treatment. Facial harmony and balance depends on both skeletal configuration as well as soft tissue drape. The soft tissue itself and its relative proportion are responsible for the visual esthetic effect. Photographic analysis is one of the most essential diagnostic aids by which the visual esthetic can be analysed directly with minimum effort. So,Photographic analysis takes a major part in diagnosis, treatment planning and degree of prognosis in Orthodontics. A large number of Punjabi people are staying in West Bengal.But there were no data available for Punjabi female population stayed in West Bengal.So, this study is aimed to determine their linear facial parameters by Photographic analysis to establish the parameter for them and compare the result to the other races and ethnic groups.Because Photographic analysis on various racial group have indicated significant differences between population. Finally all the measurements are computed statistically.

II.Material and Methods

The study is basedon Photographic analysis of Punjabi female population who stayed in West Bengal for long time. The age range selected is within 18 to 25 years, because it is the most stable period for soft tissue drape. The normal values of linear measurement of an individual had to be find out in this study. Thirty (30) subjects were selected randomly from different medical camps of Punjabi Community and students from Dr. R Ahmed Dental collage and hospital. All the samples fulfill the following criteria :

1. Bilateral Angle's class -1 molar relation with normal overjet and overbite.
2. There are no missing permanent teeth from 2^{nd} molar to 2^{nd} molar with normal alignment in Dental arches.
3. More or less bilaterally pleasing symmetrical face on clinical examination.
4. No history of any previous orthodontic treatment and more or less straight profile.

Method : Standardized frontal and Profile photographs were taken in natural head position (NHP). NHP were responsible for the true life appearances of the subject. The photographs were taken with a Nikon Coolpix 5200 camera and ED zoom lense. The lense was set in 100mm. focal length position with 5.6 apperture. Auto mode selected the required shutter speed according to available light.The camera to subject distance was maintained constant(5ft) for all subjects. The camera was positioned on a tripod stand. In frontal view the interpupillary line was kept parallel to the floor and subjects were standing on a horizontal floor, while on profile view the line from the outer canthus of the eye to the superior attachment of the ear(C-SA line) was maintained parallel to the floor.All the photographs were traced for analysis. Tracing were done by using 0.003" acetate matte tracing paper and 3H pencil.

Following landmarks are used for construction of various lane- Trichion [Tr'], Skin glabella[g'], Soft tissue nasion[Na'], pronasale[prn], Subnasale[SN], Suerior labial sulcus[SLS],Labrale suerius[LS'],Labrale inferius[LI], Stomion[ST], Inferior labial sulcus[ILS], Soft tissue pogonion[pog'],Skin menton[Me'],Tragion[Tg], Zygion[Zy],Cheilion[ch], Alare[Al], Endocanthion[En], Exocanthion[Ex], Orbilale[OR'].

Planes used for the study are Esthetic line [E-line], S-line, H-plane, pupil plane, Frankfort horizontal plane, Z-line, O-degree meridiam, Facial plane, mid sagital plane.

Linear measurement used for the study are , 1. Nose tip to H-line, 2. Upper sulcus depth, 3. Lower sulcus depth, 4. Upper lip length, 5. Lower lip length. 6. Bizygomatic width, 7. Midface height.8.Lower face height, 9. Lip prominence,10. upper and Lower lips from S-line and E-line.

In frontal view following measurement also evaluated, 1. Bilateral symmetry of faces, 2. Relationship between width of the ala of the nose and inter inner canthal distance,3 . Comparison of distance between exocanthion and endocanthion on both side, 4. Comparison between width of the mouth to distance between irises,5. vertical midface to lower facial height relationship, 6. upper and lower lip height ratio, 7. Facial Index. Finally all the measurements are computed statistically.

III.Result and Discussion

Statistical tests used:-

1. Average= $\sum x/N$, N= No. of sample, x= sum of the samples value.
2. Standard Deviation(S.D.)= $\sqrt{\frac{\sum x^2-(\sum x)^2/N}{N-1}}$
3. Standard Error(S.E.)= S.D./$\sqrt{N}$
4. Student's 't' test(to compare two averages)
   $t_k= (x_1 – x_2)/S.E.(x_1-x_2)$ or $t^k= (x-\mu)/S.E.(x)$
   x_1= sample mean, x_2= given mean from which difference to be tested.
   Calculated 't' value id referred in probability chart to find out the level of significance.

K= degree of freedom = (n_1+n_2-2) or (n-1) as the case may be.

't' value thus computed in compared with the critical value 't' at 5% level. If it is less than the 5% 't' value it will be treated as not significant. But if it is exceed critical value of 't' at 5% or 1% or 0.1% level, it will be treated as significant at the level. That is ($p<0.05$ or $p<0.001$)

5. Z-test for comparison of proportion:-
   Z= (p-P)/$\sqrt{P(1-P)/N}$, when p is the sample proportion, P is the proportion from which the difference of p to be tested, N=sample size. 'z' is normal deviate which will be significant if it exceed 1.96 or 2.58 or 3.29 at 5% , 1% or 0.1% probability levels respectively. And if it is less than 1.96, it will be treated as not significant($p>0.05$)
6. Confidence Interval(C.I.):
7. 95% confidence interval is formulated by the formula $x\pm t_k$xS.E. Expected average value is estimated to be within the confidence interval with 95% probability.

The result of this study are compared with the norms accepted for Caucasians and with other races or ethnic groups which were studied by others. Marked variations are noticed in some parameters. Some of the parameters compared with the cephalometric soft tissues analysis. The different parameters analysis on frontal and lateral photographs of Punjabi female population lived in West Bengal have been described below. Different linear measurement and proportion and ratios are analyzed. Further experiment with larger number of samples and meticulous screening procedure are needed to establish a 'norm' for the same race.

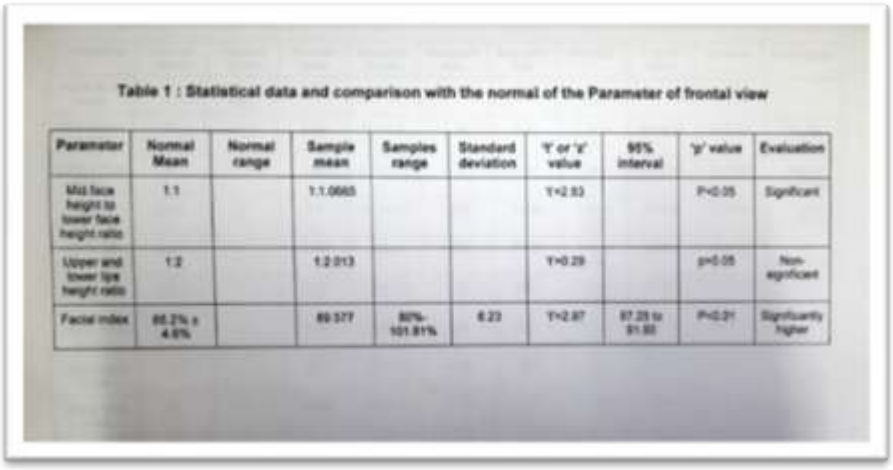
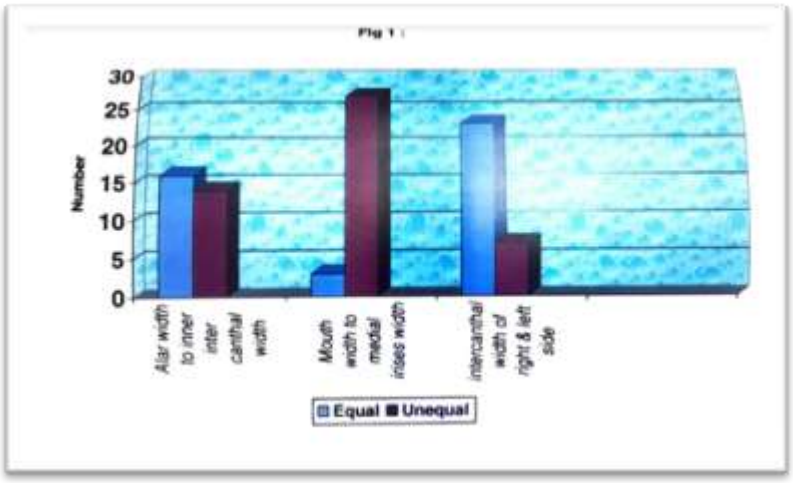


Table 1 : Statistical data and comparison with the normal of the Parameter of frontal view

Parameter	Normal Mean	Normal range	Sample mean	Samples range	Standard deviation	't' or 'z' value	95% interval	'p' value	Evaluation
Mid face height to lower face height ratio	1:1		1:1.0665			T=2.53		P<0.05	Significant
Upper and lower lips height ratio	1:2		1:2.013			T=0.29		p>0.05	Non-significant
Facial index	66.2% ± 4.6%		89.377	80%-101.81%	6.23	T=2.87	87.25 to 91.50	P<0.01	Significantly higher

1. **Facial Symmetry**: In the presentstudy, facial asymmetry are noted in every subject. Probably this rate is 100%. According to **Proffit et.al.** small degree of bilateral facial asymmetry existed in essentially all normal individuals. According to **Jacobson** if the face divided along the midsigittal plane, the nasal tip and midsymphysis point are more likely to deviate from the symmetry axis. **Arnett** and **Bergman** described most common to least common site of facial asymmetry, they were chin, mandibular angle and cheek bones.
2. **Relationship between alar width and inner intercanthal width**: In the present study in 38.3% of cases both the width are equal and in 47.7% of cases these are unequal. So probability rate is approximately 50%. This observation is significantly different from the **proffit's** observation. According to **profit** this distance should be same in a esthetically balanced face. **Farkas** observed both the width(intercanthal-32mm, alar-31mm) were almost same in Canadian female of North European origin. Similar significant difference was also seen in the study of **Yuen** and **Hianaka.** They found that nasal width(38.1±2.1 mm) was more than inter-occular distance(35.7 ±2.3mm) in Southern Chinese female.
3. **Mouth width to medial irises width:** In the present study only 10% of sample shows equal width but in 90% of the samples this width are unequal. According to **Proffit** this should be equal in esthetically balanced face. According to **Ricketts** in most harmonious proportion of face, mouth angle fell almost half way between pupil and ala of the nose or in words mouth width should be equal to medial irises width. So in the present study 'z' value= 4.38 shows significant different from **Proffit's**and **Rickett's** observation**.** Similar observation were found by **Yuen** and **Hiranaka** in the study of Southern Chinese female and **Farkas** in the study of Canadian female of North European ancestry were mouth width and medial irises width were unequal.
4. **Intercanthal width of right and left side:** In the present study these distances are equal in 76.7% of cases and unequal in 23.3% of cases. Though most of the samples are equal but 'z' value 2.92 indicate these difference are statistically significant. According to **Proffit** the distance between exocanthion and endocanthian of both sides should be equal in esthetically balanced face, so, present study does not support this view in many cases. The present study also differ from the study of **Farkas** on Canadian of North European ancestry where we found these distance were same in both sides. But **Ricketts** stated that eye width of course, varies in the human population as do all phenotype traits. **Yuen** and **Hiranaka** found the inter canthal distance of right side(26.6 ±1.8) and left side(25.8 ±1.8mm) were unequal in Southern Chinese population.

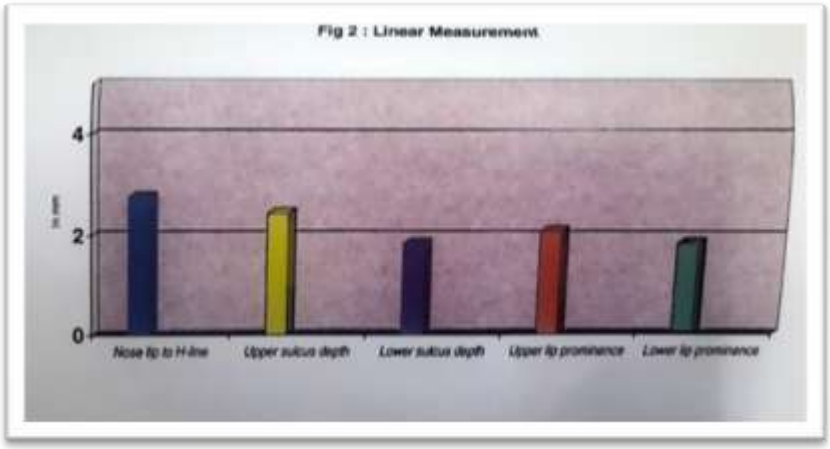


5. **Mid face to lower face height ratio:** In the present study the average ratio is 1:1.066, indicates lower face height is more than mid-face height. 't' value 2.83 indicates significant difference from the value of **Proffit(1:1), Legan and Burstone(1:1) and Arnett and Bergman(1:1).** The value is similar with **Schwarz** observation where lower facial height was slightly more(upto 10%) than mid-face height and **Scheidemal et.al.** where the value is 1:1.02 in Caucasian female. According to **Yuen** and **Hiranaka**Southern Chinese female had a longer lower face height(1:1.25) when compared with the present study.
6. **Upper and lower lips height ratio:** In the present study the mean ratio is 1:2.013. The similar value were found by **Proffit** (1.2) and **Arnett** and **Bergman**in the Cuacasian females. The present study shows no significant difference (t=0.29) from Caucasian females. **Burstone** found a ratio 1:2.3 in Caucasian girls. But according to Burstone the lower lip was slightly longer tha the present study when compared with the Caucasian girl.
7. **Facial Index:** Farkas study on Canadian of Northern European ancestry found a facial height(N'-Me') to width (Zy-Zy) index was 86.2% ± 4.6 in case of females and the height to width proportion was 1:35.1. In this study the average value of facial index is 89.58% with S.D. of ±6.23 and range is 80 to 101.81% indicates the value are significantly higher (t=2.97) than Farkas ideal value. So, the face of Punjabi females are long and narrow compared with Canadian of Northern European ancestry (Caucasian).

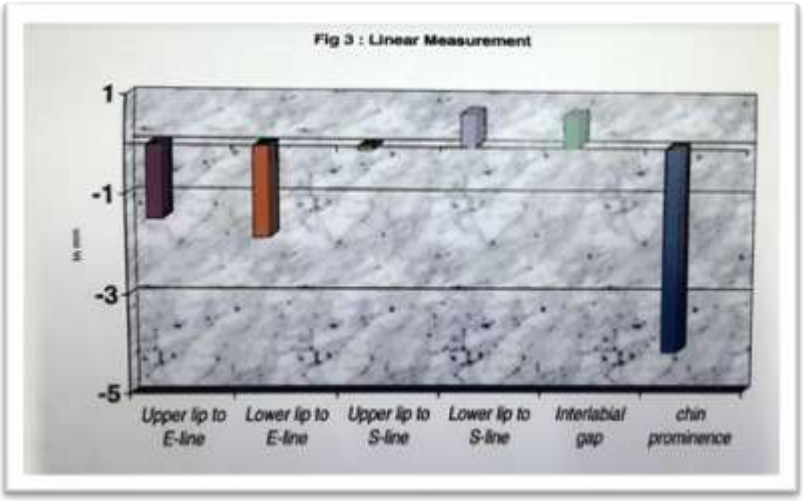
Table 2 : Statistical data and comparison with normal value of linear measurements (in mm)

Parameter	Normal mean	Normal range	Sample mean	Sample's range	Sample's S.D.	Sample's S.E.	95% C.I.	't' or 'z' value	p-Value	Evaluation
Nose tip to H-line		12 mm. max.	2.77	-2.5 to 6	2.1565	0.39	1.96 to 3.57	–	–	–
Upper sulcus depth	5	3 to 7	2.45	0 to 5.5	1.36	0.25	1.94 to 2.96	T=10.26	P<0.001	Highly significant
Lower sulcus depth	5	–	1.85	0.5 to 3.5	0.72	0.13	1.58 to 2.12	T=23.94	P<0.001	Highly significant
Upper lip prominence	3 ± 1	–	2.1	0.5 to 4.5	1.086	0.198	1.69 to 2.51	T=4.54	P<0.001	Highly significant
Lower lip prominence	2 ± 1	–	1.867	0 to 5	1.4077	0.257	1.34 to 2.39	T=0.51	p>0.05	Non Significant
Upper lip to E-line	-4 ± -3	–	-1.467	-3 to +2	1.39	0.25	-1.966 to -0.948	T=9.99	P<0.001	Highly significant
Lower lip to E-line	-2 ± 3	–	-0.183	-2.5 to +3	1.68	0.31	-0.81 to 0.44	T=5.91	P<0.001	Highly significant
Upper lip to S-line	0	–	-0.07	-2 to 2.5	1.165	0.21	-0.5 to +0.37	T=0.31	p>0.05	Non significant
Lower lip to S-line	0	–	0.66	-2 to +4	1.5	0.27	0.105 to 1.23	2.43	P<0.05	Highly significant
Interlabial gap	2 ± 2	–	0.63	0 to 3	0.955	0.17	0.28 to 0.99	T=7.84	P<0.001	Significant
Chin prominence	-3 ± 3	–	-4.17	-10 to 0	2.57	0.49	-5.16 to -3.17	T=2.39	P<0.05	Significant

8. **Nose to H-line:** According to Holdaway this measurement, if possible, should not exceed 12mm in individual of 14 years of age. Ideal value of H-line to nose tip was 6mm in Caucasian. In the present study average is 2.77 mm with S.D. ±2.16 and the range is 2.5 mm to 6mm. 95% confidence interval is 1.96 mm to 3.57mm. The value is significantly lower than the about value. The nose of Punjabi population is less pronounced when compared with lips and chin of Caucasian sample.
9. **Upper and Lower sulcus to H-Line:** Holdaway stated that both the upper and lower sulcus from H-line ideally should be 5mm and upper sulcus should be 3mm with short and thin lips and might be 7mm long in thicker lips. Here the average upper sulcus depth is 2.45 mm with S.D. of ±1.36 and range is 0mm to 5.5mm.The value is significantly lower than normal(t=10.26). In case of lower sulcus the average value is 1.88 mm with S.D. of ±0.72 and range is 0.5mm to 3.5mm. The value is significantly less than normal(t=10.26). Sushner found the upper sulcus to 'H' line distance in Negro female population was 6.23 mm ±1.98mm, with a range of 2.5mm to 11mm and lower sulcus to H-line was 2.77mm ± 0.947mm with a range of 0.5mm to 5mm. The sulcus depth of the present study is also less than Negro female.
10. **Lip Prominence in relation to subnasale pogonion line:** Legan and Burstone estimate the average upper and lower lip prominence to be 3mm ± 1mm and 2mm ±1mm respectively in Caucasian. In the present sample the average for upper lip is 2.1mm with S.D. of ±1.09, range is 0.5mm to 4.5mm, 't' value 4.54 indicating the value is significaantly lower than Caucasian. The average value for lower lip of Caucasian were 3.5mm ± 1.4mm and 2.2mm ± 1.6 mm respectively. In this study the upper lip is more retrusive and lower lip prominence is normal when compared with Caucasian. Arnett and Bergman analysed a normal man of 3mm ± 1mm for upper and 2mm ± 1mm for lower. Ashima varliathan performed the same study over Keralian population and found 3.77mm for upper and 3.95 mm for lower lip which are both significantly higher than present study.



11. **Upper and lower lips to Ricketts'E' line:** In the present sample the average value is -1.467 mm with S.D. of±1.38 and range -3mm to ±2mm, 't'=9.99 indicates significantly different from Rickett's normal value. In case of lower lip average is -0.183 mm with S.D. of ±1.684 and range is 2.5mm to 3mm, 't' value 5.91, indicat different is statistically significant. Both the lips are protrusive when compared with normal. Sushner found that both upper(-0.46mm) and lower(1.08mm) lips of American Negros were much protruded than present study. Yuen and Hiranaka found the upper lip to E-line was 1.2 ± 1.8 mm and lower lip to E-line was 2.3±1.9 mm in Southern Chinese female. So it is more protrusive than Punjabi female. Scheideman et al found a value of 5.8 mm ± 2mm and 2.4 mm ± 2.2mm for upper and lower lips respectively in Caucasian females. It indicates that the Caucasian lips were more protrusive than the Punjabi female.
12. **Upper and lower lips to Steiner's S-line:** According to Steiner for esthetically pleasing face both the lips should be on S-line and just fail to touch the S-line. In the present study the average distance between upper lip to S-line is -0.067 mm with S.D. of ±1.165 and range is -2mm to 2.5mm, 't' value 0.31 indicate upper lip to S-line distance is not significantly different from Steiner's Caucasian sample. But in case of lower lip the average is 0.66 mm with S.D. of ±1.5mm, range is -2mm to +4 mm, 't'=2.43 indicate the value is significantly more than normal or lower lip are more protrusive than Steiner's Caucasian value. N.I. Sushner observed in Negro population study that the lips were more protrusive when compared with Punjabi female population. In Negro female S-line to upper and lower lips were 4.25mm and 3.87 mm respectively.



13. **Interlabial gap:**- Burstone stated that normally there was a gap between the lips in relaxed position. Normal mean is 1.8mm in centric occlusion and 3.7 mm in rest position with S.D. of ±1.2 and ±1.6 respectively. Normal range was 0mm to 3mm. In the present study the average value is 0.693 mm with S.D. of ±0.955 and range is 0mm to 3mm, 't' value 7.84 indicate the value is significantly less than normal. But range is within normal limit when compared with Burstone Caucasian's sample. Scheideman et al estimated an average value of 0.7 mm ± 1.1 mm for Caucasian females, and the value was similar when compared with present sample. Legan and Burstone described a mean value of 2mm ± 2mm which was more than present study. According to Arnett and Burgman an interlabial distance of 1mm to 5mm was normal and it was also similar high than Punjabi female study.
14. **Chin Prominence**: According to Scheidenman et al females chin was as prominent as male's and the value was 4.5 mm/4.2 mm posterior to this reference line for Caucasian. In the present study the average value is -4.167 mm with S.D. of 2.67 mm, range is -10 to 0mm. 't' value 2.39 indicate the chin is significantly more retrusive than Caucasian of Walford.

IV.Conclusion

The present day is based on photographic analysis of Punjabi female population lived West Bengal. 30 samples were collected within the age group of 18 to 25 years. All the photographs were taken in natural head position and with normal rules of photographic technique.

Various parameter are selected for frontal view and profile view analysis and these parameter are compared with other racial and ethnic groups.

The study showed that all the faces of Punjabi females are slightly asymmetrical in both halves similar with other races, and it is a normal phenomenon.

Inner inter canthal distance and inter canthal distance of right and left side are equal in most of the cases of Punjabi females though the difference are statistically significant. But the mouth width of the most cases are unequal when compared with medial irises width.

The lower face height is slightly more than mid-face height, but the difference is nonsignificant when compared with Caucasian people, but Southern Chinese females have slightly longer lower face height than Punjabi females.

The upper and lower lip height ratio are within normal value when compared with Caucasian females. Burstone establish a greater lower lip length in Caucasian females.

In the present sample the face height and width proportion are significantly more than Caucasian. It indicates a long and narrow face.

Nose tip to H-line distance is significantly less in Punjabi females when compared with Caucasian and Keralian. It indicates a less prominent nose in the Punjabi females.

Both the upper and lower sulcus depth of Punjabi females are significantly less than Caucasian and Negro females.

Lip prominence is normal in case of lower lip but the upper lip is significantly less prominent than that of the Caucasian and Keralian population.

Both the lips are protrusive in respect to 'E'-line. Only lower lip is protrusive in respect to S-line whereas upper lip is normal when compared with Caucasian females. But both the lips are significantly less protrusive when compared with Negro and Southern Chinese females.

Interlabial gap is within normal range like Caucasian females.

Chin is significantly more retrusive than Caucasian females though the range is high.

Hence it can be concluded that the Punjabi female subject of this study differ from other races, however similarities are noticed in respect to some parameters. This suggests that though there are ethnic variation, but human being as a race have commonalities also.

So, for standardization of norms and to establish the feasibility of the same for clinical application on Punjabi females lived on West Bengal, further experiments are necessary with larger number of samples, through a meticulous screening procedure.

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References

Journals

[1]. Burstone C.J. : Lip posture and its significance in treatment planning; Am.J.Orthod,1967,V-53,Page 282.
[2]. Farkas LG : Anthropometry of the head and face in medicine; New York, 1981, Elsevier Science Publishing Co.
[3]. G. William Arnett and Robert T Bergman: Facial keys to orthodontic diagnosis and treatment planning; Am.J.Orthod,1993,V-103,N-4,5,Pages 299-312,395-411.
[4]. G.B. Scheideman, W.H. Bell,H.L. Legan,R.A. Finn and J.S. Reisch : Cephalometric analysis of dento-facial normals: Am.J.Orthod. 1980, V-78, N-4, Pages 404-420.
[5]. Legan and Burstone: Soft tissue cephalometric analysis for orthognathic surgery; J. of Oral Surgery, 1980; V-38; Pages 744-751.
[6]. Neil I. Sushner: A photographic study of the soft tissue profile of the Negro population; Am.J.Orthod, 1977, V-72, N-4, Page 738-751.
[7]. Peter Gordon and Philip Wander: Technique for dental photography; British Dental Journal 1987, V-162, Pages 307-316.
[8]. Reed A. Holdaway: A soft tissue cephalometric analysis and its use in orthodontic treatment planning. Part-I; Am.J.Orthod, 1983,V-84, N-1, Page 1-24.
[9]. Robert M. Ricketts: Esthetics, environment, and the law of lip relation; Am.J.Orthod, 1968, V-54, N-4, Pages 272-289.
[10]. Stephen W.H. Yuen and David K. Hiranaka: A photographic study of the facial profiles of Southern Chinese adolescent; Quintessence Int, 1989, V-20, N-9, Page 665-676.
[11]. Valiathan Ashima and John K.K. : Soft tissue cephalometric analysis of adults from Kerala; J.I.D.A.,1984, V-56,Nov, Page 419-422.
[12]. Virgilio F. Ferrario, Chiarella Stroza, Alessandro Miani and Gianluca Tartaglia: Craniofacial morphometry by Photographic evaluation; Am.J.Orthod, 1993,V-103,N-4, Page 327-336.
[13]. Vahid Mosvelgogha et al- Open dentistry journal 2015, July 31

Books

[1]. W.R. Proffit, H.W. Fields and D.M Sarver: Contemporary Orthodontics; 2007, Mosby an imprint of Elsevier;Forth edition, Pages 176-189.
[2]. Text book of Alxander Jacobson: Radiographic cephalometry; Quintessence Publishing, Pages 240-253 and 276-292.

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