

# Evaluation of Facial and Dental Midline Discrepancies in Nepalese Population

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## ABSTRACT

**Background:** The facial midline is defined by the landmark such as the nose, philtrum, and chin aligned in a straight line. It should be in the center of the face and should coincide with the dental midline. But clinically it is often observed that some discrepancies exist between facial and dental midlines. Thus the aim of this study was to evaluate the facial and dental midline discrepancies.

**Methods:** A total of 300 subjects, 150 male and 150 female from People's Dental College and Hospital were selected. Full facial view standardized photograph with a posed smile with teeth in occlusion was taken with Canon 400D digital SLR. For standardized measurement vertical metallic scale with millimeter, markings were placed on the right side of the patient in all cases. The software program Digimizer image analysis (version 4.6.1) was used to determine the facial and maxillary dental midline.

**Result:** This study showed 6.66% of male and 12% of female had perfectly coinciding F1 facial midline (perpendicular from the midpoint of inner canthus distance), F2 facial midline (line joining the midpoint of inner canthus and the midpoint of the base of the nose) and maxillary midline. 26% of males and 28% of females had less than 1mm of the discrepancy of F1 midline to maxillary midline whereas 41% of males and 38% of females had less than 1 mm of a discrepancy between F2 facial midline and maxillary midline. The study also showed that 24% of males and 24.66% of females had none coincidence of any of the midlines with one another.

**Conclusion:** Most of the Nepalese have noncoinciding facial and dental midline but females have more coinciding midlines in comparison to males. The shifted facial midlines are more towards the left side in relation to maxillary dental midline.

**Keywords:** Coincidence, Dental midline, Facial midlines

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## INTRODUCTION

Symmetry simply means balanced distribution of various parts around the common axis whereas asymmetry means imbalance in the distribution of parts<sup>1</sup>. Perfect symmetrical body including face seldom exists in living beings. Asymmetry can be either functional or morphological<sup>2</sup>. Asymmetrical face can be described as difference in shape and size of facial parts in two halves of the face<sup>3</sup>. Clinically facial asymmetry occurred in about 1/3 of the dentofacial deformed population in which lower third of face was affected more than the upper and middle third of the face<sup>4</sup>.

In orthodontics, trends have been changing from Angle paradigm which focused mainly on ideal occlusion to soft tissue paradigm, focusing mainly on soft tissues and facial esthetics<sup>5</sup>. With increase in focus on facial esthetics, more concern on dental and occlusal asymmetries and midline discrepancies also increasing<sup>6</sup>. Any deviation from normal proportion and arrangement of face and teeth results in dentofacial asymmetry. Though minor asymmetry can be detected only thorough detail examination<sup>7</sup>. The facial midline is determined with the help of landmarks like nose, philtrum and chin aligned in a straight line while dental midline is determined with coinciding mid sagittal line of upper and lower arches during centric relation<sup>8</sup>. But clinically it is often observed that some discrepancies exist between facial and dental midlines<sup>9</sup>. Many researchers including Ernest L. Miller et al<sup>10</sup> have noticed that facial and maxillary midline usually coincides whereas maxillary and mandibular midline does not<sup>11</sup>. Even the facial midline and symmetry is affected by the deviated nose as well<sup>12</sup>.

Most of the studies regarding these midlines were done in western population and much have not been done in Nepalese population. Thus the aim of this study was to evaluate the coincidence between facial midlines to maxillary dental midline, to calculate the amount of discrepancy between midlines and to determine the side of shift of facial and maxillary dental midline in Nepalese population.

## MATERIALS AND METHODS

In the present study 300 subjects, both male and female, 150 each, of age above 17 years were selected from students, interns and the individuals

who visited the Department of Orthodontics in People's Dental College and Hospital. Research was approved by the Institutional Review Committee of Institute of Medicine, Tribhuvan University (Ref No- 270/ (6-11) E2 076/077). Full facial view standardized photograph of posed smile with teeth in occlusion was taken. The digital camera (Canon 400D digital SLR) was made fixed by mounting it on tripod. The distance between the subject and camera was kept fixed (4 feet) in all photographs. For standardized measurement vertical metallic scale with millimeter markings was placed on the right side of the patient in all cases. The software program Digimizer image analysis (version 4.6.1) was used to determine the facial and maxillary dental midline.



Figure 1: Facial smile photograph showing F1, F2 Facial midlines and maxillary midline

The first facial midline was drawn perpendicular from the midpoint of inner canthus distance as F1 facial midline and the second facial midline was drawn joining the midpoint of inner canthus and the midpoint of the base of the nose as F2 facial midline. The maxillary dental midline drawn through the tip of the incisal embrasure between the two maxillary central incisors (Figure 1). Finally distance between facial midlines, (F1 and F2) and maxillary dental midline were measured.

The inclusion criteria for the study were

- Age above 17 years.

- All anterior teeth present with normal alignment.
- No history of congenital conditions or trauma affecting facial form and appearance.
- No history of orthodontic treatment.

The exclusion criterions of photographs were

- Images with bad resolution.
- Images with rotated head position.
- Visible asymmetry involving eyes.
- Linear smile (anterior teeth not visible on posed smile).

The data were collected and descriptive statistics were drawn from the quantitative data using the Statistical Package for Social Sciences (SPSS version 20.00, Chicago, Inc.).

## RESULTS

Table 1 shows the comparison of midline discrepancies between F1 facial midline to maxillary

Gender	Participants	Outcome	Percent
Male	150	10	6.66
Female	150	18	12

Table 2: Coinciding F1, F2 facial midlines and Maxillary dental midline

Midline	Discrepancy									
	0-1mm		1.1-2mm		2.1-3mm		3.1-4mm		>4mm	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
F1 to maxillary dental midline	39 26%	42 28%	23 15.33%	32 21.33%	27 18%	29 19.33%	26 17.33%	14 9.33%	35 23.3%	33 22%
F2 to maxillary dental midline	41 27.33%	58 38%	25 16.66%	27 18%	31 20.66%	35 23.33%	19 12.66%	14 9.33%	34 22.6%	16 10.6%

Table 3: Coinciding F1 and F2 facial midlines only

Gender	Position from maxillary dental midline	Outcome	Percent
Male	Right	10	6.7%
	Left	28	18.7%
Female	Right	16	10.6
	Left	16	10.6

midline and F2 facial midline to maxillary midline. While examining the coincidence of all midlines, only 6.66% of male and 12% of female had perfectly coinciding F1, F2 and maxillary midline (Table 2).

Table 3 represents the coincidence of F1 and F2 facial midlines only but not with the maxillary dental midline whereas Table 4 represents the coincidence of both facial midlines with maxillary dental midline separately.

Table 4: Coinciding F1, F2 facial midlines with Maxillary dental midline separately

Gender	F1 with maxillary dental midline	F2 with maxillary dental midline
Male	16 (10.66%)	21 (14%)
Female	8 (5.33%)	26 (17.33%)

Table 5: Shift of F2 than F1 facial midline on same side

Gender	Increased shift of F2		Decreased shift of F2	
	Right	Left	Right	Left
Male	6 (4%)	7 (4.66%)	5 (3.33%)	11 (7.33%)
Female	1 (0.66%)	9 (6%)	7 (4.66%)	12 (8%)

Table 5 shows the increased and decreased shift of F2 facial midline than initial F1 facial midline from maxillary midline. Table 6 represents the data regarding non coincidence of any of the midlines with one another which shows that 24% of male and 24.66% of female had the facial midlines on either side of the maxillary midline.

Table 6: F1 and F2 facial midlines on different side of maxillary dental midline

Gender	Frequency	Percentage
Male	36	24%
Female	37	24.66%

## DISCUSSION

Generally coinciding facial midline to maxillary dental midline is considered as normal which increases the esthetic quality of the face<sup>8-13</sup>. Similarly slight facial asymmetry and non-coincidence of facial and dental midlines are also considered as normal but the sense of normal or abnormal depends upon individual perception<sup>2</sup>. Thus the aim of this study was to evaluate the coincidence of midlines and severity of the discrepancies of those midlines.

From this study it was observed that majority of the individuals had non coinciding facial and dental midlines. Only 9.33% of total subjects (6.66% of male and 12% of female), had perfectly coinciding facial midlines with maxillary midline. In contrast 47.9% of Pakistani population<sup>14</sup>, 72.5% of Karnataka population<sup>11</sup> and 85% of Caucasian<sup>15</sup> had facial and maxillary dental midline coinciding. All of those

studies considered only one parameter as facial midline which was similar to F2 facial midline of this present study. In our study, 15.66% in total (14% male and 17.33% female) of the sample had F2 facial midline coincided with maxillary midline. Thus if we considered F2 as only facial midline then 24.99% Nepalese had coinciding facial and dental midline. Likewise 8% (10.66% male and 5.33% female) had F1 midline coinciding with maxillary midline. This showed that higher percentage of Nepalese population had F2 coinciding with maxillary midline than F1 midline. From Table 1 also it was observed that higher percentage had less than 1 mm of discrepancy of maxillary midline with F2 than F1 midline. F1 midline coincidence with maxillary midline was affected by the level of the eyes. Difference in eye level caused shift of perpendicular line away from the maxillary midline.

In the present study, 23.33% (25.33% male and 21.33% female) had F1 and F2 facial midlines coinciding with each other but not with maxillary midline. This means in these subjects facial midlines are on normal position but the maxillary arch rotated from the normal position. Result also indicated that females had facial midlines shifted equally on either side of the maxillary midline but majority of males had facial midlines on left side of the maxillary midline (Table 3).

Similarly 7.66% (8.66% male and 6.66% female) had increased shift of F2 facial midline than F1 midline, which meant they had the deviation of nose away from the maxillary midline. 11.66% (10.66% male and 12.66% female) had decreased shift of F2 midline than F1 midline which meant they had the nose tip closer to the maxillary midline. This showed that deviated nose is one of the cause of facial and dental asymmetry. Study of Yi Jong Sook et al also indicated that deviated noses are responsible for the facial asymmetry<sup>16</sup>.

If we considered the result of Table 3 and 5 combined as midline deviation, then 42.66% of Nepalese had deviated midline in which 15% were right deviated and 27.66% were left deviated. In Pakistani population 52.1% had midline deviation and majority were on left side deviation<sup>14</sup> whereas in Karnataka population 48.2% had midline shift and majority were right side deviation<sup>11</sup>. The study of Jain S. et al reported 77% of their subjects had midline shift<sup>17</sup> but the study was done in individuals who came for orthodontic treatment. Similarly in Saudi population 42.5%<sup>18</sup> had midline shift and mainly on right side deviation. The study done in female celebrities for smile analysis by Sulieman Al

Johany et al had their midline deviation in 36%<sup>19</sup>. Finally 24.33% of Nepalese (24% male and 24.66%female) had F1 and F2 facial midline distributed on either side of the maxillary midline which indicates the non-coincidence of any of the midline with one another. This happened because these individual had different eye level, deviated nose and rotated maxillary arch.

## CONCLUSION

Most of the Nepalese have non coinciding facial and dental midline. Females have more coinciding midlines in comparison to male. The shift of facial midlines are more towards left from the maxillary dental midline. It was also observed that coincidence of midlines are largely affected by level of eyes, deviation of the nose and transverse rotation of the maxillary arch.

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