

# Comparative study of some of the qualitative and quantitative dermatoglyphic patterns among the patients of cleft lip and cleft palate against normal population

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## Abstract

**Introduction:** Dermatoglyphics is the scientific study of epidermal ridges and their configurations on the volar aspect of palmar and plantar region. The main etiological factor of cleft lip and cleft palate is genetic in nature. The influences of genetic and environmental factors on early development are often reflected by the altered dermatoglyphics. **Aims and Objectives:** to study the occurrence of simian crease, Sydney line and a-b ridge count in cleft lip and cleft palate patients. **Material and Methods:** The present study is a case control study carried out from Dec 2004 to Nov 2006. 86 cases of cleft lip with or without cleft palate and isolated cleft palate attending OPD of Govt. Medical College and Hospital, Miraj, Civil Hospital, Sangli, Aditya Burn and Plastic Surgery Hospital, Sangli and 100 controls with age and sex matched during the study period were included in study. The cases and controls divided in three groups: A (cleft lip with or without cleft palate); B (isolated cleft palate) and C (Controls). In this study, 'STANDARD INK METHOD' for obtaining the dermatoglyphic prints described by Cummins (1936) and Cummins and Midlo (1961) was used. The parameters studied among different groups were sex wise distribution, hereditary basis, analysis of Fingertip Patterns and analysis of dermatoglyphic 'atd' angle. Appropriate statistical tests were applied like Mean, Standard Deviation (S.D.), standard Error (S.E.), Unpaired 't' test of significance, for quantitative data, Chi-square test for qualitative data and 'P' value. **Observations and Results:** Out of 82 Patients, 50 Patients are having cleft lip with or without cleft palate defect, while 32 patients are having isolated cleft palate defect with female dominance. The occurrence of simian crease and Sydney line is significantly increased in cases of group A and group B in comparison with group C except males of group B for simian crease. The a-b ridge count is also increased significantly in group A and group B in comparison with group C except females of group A. **Conclusion:-**Hence, we conclude that the finding of present study reveals statistically significant differences between congenital cleft lip with or without cleft palate and isolated cleft palate patients and the normal population and indicates to a genetic difference between them.

**Key Word:** dermatoglyphic Simian crease.

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## INTRODUCTION

Genetic abnormalities are inherited from parents to offspring and are reflected in dermatoglyphic pattern. Hence study of dermatoglyphics proves to be very useful in predicting hereditary disease in patients. Abnormal dermatoglyphic patterns are known to occur with genetic disorders like Mongolism, Turner's syndrome, Klinefelter's syndrome etc.<sup>1,2,3</sup> With the advancement in the field of dermatoglyphics, it will be possible in near future, to predict to a large extent, whether an individual is suffering or will suffer in future from a genetic disease.

Also with the dermatoglyphic study in parents, the possibility of occurrence of disease in offspring, can be commented soon in near future. Cleft lip is a psychologically traumatic condition and constitutes a tremendous social handicap to the patients. Cleft lip and cleft palate are common defects that result in abnormal facial appearance and defective speech. Development of the lip and the palate in human embryo takes place from the fourth to twelfth week of intrauterine life. Disruption in either of these events may lead to formation of cleft, either of the lip, palate or both. It is now, generally, accepted that the main aetiological factor of cleft lip and cleft palate is genetic in nature, although in some cases a mixed genetic and environmental causation has been suggested.<sup>4,5,6</sup> The influences of genetic and environmental factors on early development are often reflected by the altered dermatoglyphics. Therefore taking into consideration, the genetic predisposition of dermatoglyphic characteristics in cleft lip and cleft palate, the study was undertaken to find out correlation between them, so that it may prove helpful in the diagnosis of disease and its pattern of inheritance.

**AIMS AND OBJECTIVES**

1. To study the finger and palmar dermatoglyphic patterns of Simian crease and Sydney line in cleft lip and cleft palate patients.

2. To compare the a-b ridge counts of cleft lip and cleft palate patients with normal population.

**MATERIAL AND METHODS**

The present study is a case control study carried out from Dec 2004 to Nov 2006 having 86 cases and 100 controls. All the cases of the of cleft lip with or without cleft palate and isolated cleft palate attending OPD of Govt. Medical College and Hospital, Miraj, Civil Hospital, Sangli, Aditya Burn and Plastic Surgery Hospital, Sangli during the study period were included in study. In this study, ‘STANDARD INK METHOD’ for obtaining the dermatoglyphic prints described by Cummins (1936) and Cummins and Midlo (1961)<sup>1,6</sup> was used. Following the above mentioned method, finger and palm prints of 82 patients were obtained. As control, prints of 50 normal males and 50 normal females were used. Both the normal controls and patients are matched for age, sex, socioeconomic status. All prints are studied and analyzed.

**Analysis of data**

Analysis of Simian crease, Sydney line and a-b ridge count was done. Appropriate statistical tests were applied like Mean, Standard Deviation (S.D.), standard Error (S.E.), Unpaired ‘t’ test of significance, for quantitative data, Chi-square’ test for qualitative data and ‘P’ value.

**OBSERVATIONS**

Out of 82 Patients, 50 Patients are having cleft lip with or without cleft palate defect, while 32 patients are having isolated cleft palate defect. Out of 82 patients (of cleft lip with or without cleft palate and isolated cleft palate) 40 are males while 42 are females.

**Table 1:** Groups of patients and controls selected for the study

| Groups | Clinical Diagnosis                     | No. of Cases  |               |       | Positive History Family |       |
|--------|--|---------------|---------------|-------|-------------------------|-------|
|        |  | Male          | Female        | Total | No.                     | %     |
| A      | Cleft lip with or without cleft palate | 28<br>(56%)   | 22<br>(44%)   | 50    | 06                      | 12.00 |
| B      | Isolated cleft Palate                  | 12<br>(37.5%) | 20<br>(62.5%) | 32    | 06                      | 18.75 |
| C      | Controls                               | 50<br>(50%)   | 50<br>(50%)   | 100   | 00                      | 00    |

The dermatoglyphic patterns are analysed and subjected to nonparametric statistical tests to evaluate significant patterns of identifiable differences between the cleft lip with or without cleft palate, isolated cleft palate and controls.

**Table 2:** Frequency Distribution Of Simian Crease

| Group | Male |       | Female |       | Total (M+F) |       |
|-------|------|-------|--------|-------|-------------|-------|
|       | No   | %     | No     | %     | No          | %     |
| A     | 16   | 28.57 | 17     | 38.63 | 33          | 33.00 |
| B     | 05   | 20.83 | 13     | 47.50 | 24          | 37.50 |
| C     | 06   | 06.00 | 08     | 08.00 | 14          | 07.00 |

Table No.2 shows frequency distribution of Simian crease occurrence in group ‘A’, ‘B’ and control group ‘C’. There is increased frequency distribution of Simian crease in group ‘A’ and group ‘B’ when compared with group ‘C’.

**Table 3:** Frequency Distribution Of Sydney Line

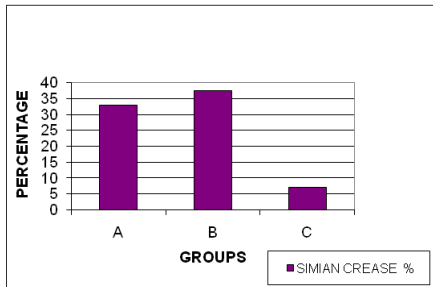
| Group | Male |       | Female |       | Total (M+F) |       |
|-------|------|-------|--------|-------|-------------|-------|
|       | No   | %     | No     | %     | No          | %     |
| A     | 19   | 33.92 | 12     | 27.27 | 31          | 31.00 |
| B     | 07   | 29.16 | 11     | 27.50 | 18          | 28.12 |
| C     | 08   | 08.00 | 06     | 06.00 | 14          | 07.00 |

Table No. 3 shows frequency distribution of Sydney line. This table shows that there is an increase in number of Sydney lines in right as well as left hands in both sexes in group ‘A’ and ‘B’ when compared with group ‘C’.

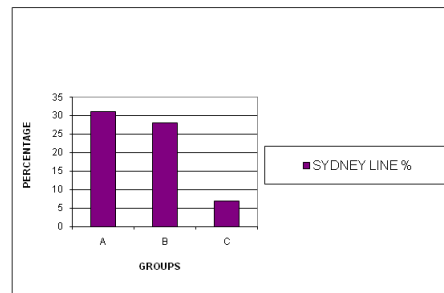
**Table 4:** Statistical Calculation For ‘a-b’ Ridge Count

| Group | Sex | $\bar{x}$ | S.D     | SE      |
|-------|-----|-----------|---------|---------|
| A     | M   | 39.875    | 6.7561  | 0.9028  |
|       | F   | 38.5454   | 7.1682  | 1.0806  |
|       | M+F | 39.29     | 6.9717  | 0.69717 |
| B     | M   | 38.875    | 4.51213 | 0.9210  |
|       | F   | 40.875    | 5.5999  | 0.8854  |
|       | M+F | 40.125    | 5.3077  | 0.6634  |
| C     | M   | 34.98     | 4.3243  | 0.43243 |
|       | F   | 36.84     | 5.2492  | 0.52492 |
|       | M+F | 35.91     | 4.8981  | 0.3463  |

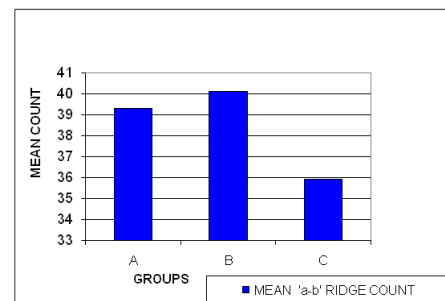
There is increase in mean values of ‘a-b’ ridge count in group A, and group B when compared to group ‘C’ for both males and females in both the hands. There are statistically significant differences in ‘a-b’ ridge counts in comparison group ‘A’ and ‘B’ when compared with control group ‘C’ except for females of group ‘A’, where in females of group ‘A’, the observed differences are not significant when compared with females of group ‘C’, although there is an increase in the mean values of ‘a-b’ ridge count in females of group A in comparison to females of group ‘C’ where the increase in ‘a-b’ ridge count observed is by chance.



**Figure 1**



**Figure 2**



**Figure 3**

## DISCUSSION

Dermatoglyphics, as a diagnostic tool, is well reflected in a number of diseases which have strong hereditary and genetic basis. Cleft lip and cleft palate defects have a strong genetic and hereditary basis, so that patients with these defects are expected to show some of the dermatoglyphic variations, as dermatoglyphic features are under control and influence of genetics and heredity. The present study, consisted of, 50 patients of cleft lip with or without cleft palate forming group A, 32 patients of isolated cleft palate forming group B and 100 individuals in the group C served as controls. The prints were obtained by the Standard Ink Method and were analysed to find out variations in dermatoglyphic features among the patients and controls. The sex wise distribution, hereditary basis, qualitative analysis of simian crease and

Sydney line pattern and ‘a-b’ ridge count parameters were observed among different groups. These observations are subjected to tests for statistical significance and findings are compared with other previous studies of dermatoglyphics in cleft lip and cleft palate defects. The sex wise male preponderance is observed in cleft lip with or without cleft palate cases. In isolated cleft palate cases, female preponderance is observed. In cleft lip with or without cleft palate cases, male: female ratio is 1.27: 1, in isolated cleft palate cases male: female ratio is 0.6:1 It means that cleft lip with or without cleft palate is more common in males and isolated cleft palate is more common in females and this is in accordance with the findings of Neel (1958)<sup>11</sup>; Theodore. H. Ingalis, Irene. E. Taube, Marcus. A. Klingberg (1964)<sup>12</sup>; Charles. M. Woolf, Robert. M. Woolf (1964)<sup>13</sup>; Harry (1968)<sup>14</sup>;

Thomas (1968)<sup>15</sup>; Burdi (1969)<sup>16</sup>; Gary, Lisa and Cynthia (1991)<sup>17</sup>; T.W. Sadler (1995)<sup>18</sup> In cleft lip with or without cleft palate case, 12% patient had positive family history. In isolated cleft palate cases, 18.75% patient had positive family history. This suggests that the cleft lip and cleft palate deformities are inherited in families as a chromosomal recessive or dominant disorders or as chromosomal aberrations. Jaworska (1969)<sup>19</sup> described the presence of Simian line in 5.3% of children with cleft palate as compared to 3.2% of controls but the difference was insignificant. In our study, Simian line is present in 33% patients in cleft lip with or without cleft palate cases and 37.50% in isolated cleft palate cases as compared to 7% in controls and the difference is statistically significant except for males in isolated cleft palate cases. Balgir R.S. (1993)<sup>20</sup> stated that Simian creases were more common in cleft lip, cleft palate and cleft lip with cleft palate group. Our study goes in accordance with this as there is increased frequency distribution of Simian creases in patients as compared with controls. Balgir R.S. (1993)<sup>20</sup> stated that Sydney lines were more common in cleft lip, cleft palate and cleft lip with cleft palate patients as compared to controls. Our study goes in accordance with this as we also found increased frequency distribution of Sydney lines in cleft lip with or without cleft palate cases and isolated cleft palate cases as compared to controls. The differences are also statistically significant for cleft lip with or without cleft palate and also in isolated cleft palate cases. Woolf, C.M, Gianas. A. D. (1977)<sup>21</sup> observed significant difference in a-b ridge count in propositi with a family history of cleft lip or cleft palate and no difference is observed in propositi without a family history. In our study also there is an increase in mean values of a-b ridge count in cases of cleft lip with or without cleft palate and isolated cleft palate as compared to control, but here we have studied all patients with or without family history. In our study the differences are statistically significant for both cleft lip with or without cleft palate cases and isolated cleft palate cases except for female cases of cleft lip with or without cleft palate. R.N. Deshmukh, M.S. Grewal and S.S. Sidhu (1981)<sup>22</sup> reported that the mean a-b ridge count of cleft lip with or without cleft palate group differed significantly from controls. Our study is in accordance with this study as we found increased mean values of a-b ridge count except in females. Goldberg C. J, Fogarty E.E Moore. D.P Dowling. P.E (1997)<sup>23</sup> observed significantly increased variance about the mean of a-b ridge count in patients of vertebral defects and anomaly of cleft lip and cleft palate as compared to controls. Our study goes in accordance with this as we have found increased mean values of a-b ridge count in cases of cleft lip with or

without cleft palate and isolated cleft palate as compared to control.

## CONCLUSION

The utility of the dermatoglyphics in aetiological studies is a recent matter of study with very less available information and literature of it. The findings of present study reveal statistically significant differences between congenital cleft lip with or without cleft palate and isolated cleft palate patients and the normal population and indicates to a genetic difference between them. These results are supportive of a genetic aetiology in cleft lip with or without cleft palate and isolated cleft palate anomalies and likelihood of the manifestations of chromosomal aberrations.

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