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## Original Research Article

## A study on comparison of lip prints and finger prints based on gender and its reliability in forensic odontology: A cross-sectional study

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## ABSTRACT

In an individual, fingerprints and lip prints are one of the vital parts in identifying the person in both civil and criminal cases because of their uniqueness. The aim of the study is to identify if any correlation between lip prints and finger and also based on gender wise.

The present study was carried to determine the distribution of different patterns of both finger and lip prints. The study comprised of about 200 subjects, aged between 17 to 24 years. Impressions were collected using lip prints and ink stamp pad and pasted on filter paper and cellophane tape. Chi square test was used to find out any relation between lip prints and finger prints.

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### 1. Introduction

Nowadays we come across a number of incidents and crimes across the globe which shatter the lives of victims and family members. In all these crimes Identification of human type is one of the fundamental step in determining relationship between social and legal levels. Forensic sciences help to identify the crimes and provide criminal justice, one can identify a person living or dead in criminal justice. Forensic science is a board that includes DNA analysis, fingerprint analysis (dactylography), bloodstain pattern analysis, tool mark analysis, odontology, pathology etc. In this forensic sciences along with fingerprints and

DNA analysis, dental identification like lip prints, bite marks and rugae patterns play a significant role in line identification procedure in many aspects.

Dentists have a vital role in identification procedures. There are many branches in dentistry. There are many branches in dentistry. One among them is forensic odontology which deals with the interest of proper handling and examination of dental evidences and presentation of dental findings. According to FDI, forensic odontology is a branch of dentistry that in the interest of justice deals with proper handling and examination of dental evidence and with the proper evolution and presentation of dental findings.<sup>1</sup> Forensic odontology is the study of dental applications in legal proceedings and presumes a multidisciplinary approach.

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In 1950 research on usage of lip prints for human identification was brought into action and new developments were carried out in the preceding years of 1960s and 1970s. Lip prints and fingerprints in forensic odontology serves as a very essential diagnostic aid. As we know that every individual has a unique Lip print and analogues to fingerprints. But by focusing deeply the labial form a characteristic pattern called lip print. The study is named as "Cheiloscopy". There exists, wrinkles and grows on lips which are named by Tsuchihashi<sup>2</sup> as Sulci Laborium Ruborum. There have been various other classification by Suzuki and Tsuchihashi Figure 1.




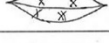
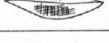

Types of Lip Prints	
<b>Type I</b> Complete vertical grooves (CVG)	
<b>Type I'</b> Partial vertical grooves (PVG)	
<b>Type II</b> Forked grooves (FG)	
<b>Type III</b> Intersecting grooves (IG)	
<b>Type IV</b> Reticular grooves (RG)	
<b>Type V</b> Undetermined grooves (XG)	

Fig. 1:

In an individual, fingerprints are also one of the vital parts in identifying the person in both civil and criminal cases because of their uniqueness.<sup>3</sup> Finger tips consist of interleaved ridges and valleys. These ridges evolve over the years for the purpose of grip and grasp. As fingerprints consist of valleys, they help in specific identification purpose. Fingerprints of formed by genetic combination, environmental factors in human body. This is the reason even monozygotic twins have different fingerprints,<sup>4</sup> so here by we can tell that fingerprints establish a personal identification method and mostly used for tracking of criminals. Hence, the present study was aimed to find out the correlation between gender on both lip prints and fingerprints. To find out any difference which is statistically significant in gender based.

**2. Methodology**

In this was a cross-sectional study that was conducted in Sree Sai dental College and research Institute in the place of Srikakulam district, Andhra Pradesh. With total number of 200 subjects were brought together and study was made between the age group of 17 -24. Ethical approval obtained from the ethical board of Sree Sai Dental College and Research Institute. Informed consent taken from each participant. Ethical clearance was obtained from the institutional review board. Convenience sampling technique was used for data collection. Inclusion criteria -

young adults without any diseases related, tulips mucosa were included. Exclusion criteria: Subjects with congenital deformities, allergic to lipstick were not included in the study. Subjects were not willing to participate, are not included in the study

**2.1. Collection of the data**

As a study was conducted in college. All those participants informed really about the objective of the study. So the participants were clearly told to keep their lips clean and to apply a thin layer of lipstick on their lips and spread it evenly. The Lip prints are recorded using cellophane technique, which was proposed by Sivapathasundaram et al., which is one of the accurate techniques. The glue which is present on the cellophane paper is placed over the lips so that it will stick and thoroughly record the lip prints. After a few seconds, the cellophane paper was carefully removed and was stuck on a bonded white paper. After the procedure is completed, the lip prints were checked for clarity, and if there is any smudging of the print was noticed, the procedure was again repeated.

The Lip prints, which were collected were studied by an expert in all the quadrants using a magnifying lens. The middle part of the lower lip which is 10mm wide what is taken as the study area.

Lip prints classified by using Suzuki Figure 2:



Fig. 2:

By using A4 sheet the lip prints were recorded and were coded based on the patterns of the prints, In this process two calibrated examiners were trained to access the lip prints. On the lip, print patterns were interrupted, which is based on the Tsuchihashi and Micheal Kucken classification, respectively in Figure 3.



Fig. 3:

## 2.2. Statistical analysis

Statistical analysis—the difference between males and females in relation to lip prints was done using chi square test. The *p* value less than 0.05 was considered significant. There was no significant difference observed between genders as per the study was made. All the statistical procedures were done using capital SPSS 22.0 version SPSS INC-Chicago, II USA.

## 3. Results

Among a total of 200 students, 31 were males and 169 were females. The participants were between 17 to 24 years (mean  $22.5 \pm 3.73$  years). There was no missing data.

In our study the most common lip print pattern among all participants was intersected ( $n = 44, 29.3\%$ ) followed by vertical ( $n = 38, 25.3\%$ ), reticular ( $n = 35, 23.3\%$ ) and branched ( $26, 17.3\%$ ). The undetermined pattern ( $n = 7, 4.7\%$ ) was found to be the least prevalent. (Table 1).

**Table 1:** Distribution of subjects based on gender

Gender	Respondents	Percentage (%)
Male	31	15.5%
Female	169	84.5%

**Table 2:** Distribution of lip prints

	Respondents (N)	Percent (%)
Vertical	68	34.0
Branched	35	17.5
Reticular	35	17.5
Intersectional	33	16.5
Un Determined	29	14.5

**Table 3:** Distribution of finger prints both right and left thumb

	Right Thumb		Left Thumb	
	N	%	N	%
Loop	137	68.5%	126	63%
Arch	17	8.5%	25	12.5%
Whorl	46	23%	49	24.5%

**Table 4:** Distribution of finger prints both right and left index

	Right Index		Left Index	
	N	%	N	%
Loop	110	55.0	108	54.0
Arch	41	20.5	35	17.5
Whorl	49	24.5	57	28.5

## 4. Discussion

Every human being lives to die another day and it is very important at few occasions where forensic examination of deceased becomes a necessity. Identity is a phenomenon which comprises a set of physical characters, functional and psychic, normal or pathological characters that defines an individual. Our present study was to determine the correlation between lip prints and fingerprints. There are many studies which happened in the past to ensure the correlation present between lip prints and fingerprints. In the present study, we have modified the collection data by taking both index finger and thumb finger of every individual whether if there is any difference present. Synder was one of the France, greatest criminologist, who first recommended the use of lip print in personal identification and criminalization.<sup>5</sup> Evidence of the lip prints by forensic team will be a great supplement tool in the court of law to provide as an evidence. Regarding the lip prints, the prints start formation as early as the sixth week in uterine life.<sup>6,7</sup> It has been noted that little prince recover after underlining, activations, such as minor trauma and inflammation. However, major trauma to the leave me lead to scaring endha surgical treatment rendered to correct the path to sis that my finger size and shape their by asking the pattern as well as the morphology of the grooves,<sup>7</sup> but the use of lip prints in criminal cases is limited as compare to fingerprints because the credibility of lee prints has not been formally established in a court of laws till date. The present study in to correlate the relation between lip print pattern with that of fingerprint pattern.

Sharma et al. had concluded that undetermined lip prints, 27.5% in males, vertical and partial vertical difference in females, 25% or common.<sup>8</sup> Saraswathi et al. reported that intersecting pattern was the most common in males and females which is 39.5% and females 36.5%<sup>9</sup> and the findings were similar to that of Sivapathasundaram et al.<sup>10</sup> In the study done by Gondivkar et al. Criss cross lip pattern was reported in 51.05% males and 37.06% branded lip pattern females.<sup>11</sup>

Study conducted by Srilekha et al. reported that type I to be more predominant in females and Types I and IV to be predominant in males.<sup>12</sup>

Nagasupriya et al. reported predominant pattern to be branch type 49% in males and 40% in females.<sup>13</sup>

Our study reports that 9.7% of males lip prints were undetermined, and vertical lip prints were recored high

**Table 5:** Distribution of right and left thumb prints based on gender wise

Gender	Right- thumb prints						Left- thumb prints					
	Loop		Arch		Whorl		Loop		Arch		Whorl	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>Males</b>	19	61.3%	2	6.5%	10	32.3%	20	64.5%	2	6.5%	9	29%
<b>Females</b>	118	69.8%	15	8.9%	36	21.3%	106	62.7%	23	13.6%	40	23.7%

**Table 6:** Distribution of right and left index finger prints according to gender wise

Gender	Right- index finger prints						Left- index finger prints					
	Loop		Arch		Whorl		Loop		Arch		Whorl	
	N	%	N	%	N	%	N	%	N	%	N	%
<b>Males</b>	16	51.6%	5	16.1%	10	32.3%	19	61.3%	4	12.9%	8	25.8%
<b>Females</b>	94	55.6%	36	21.3%	39	23.1%	89	52.7%	31	18.3%	49	29%

**Table 7:** Distribution of lip prints according to gender wise

	Type -1		Type -2		Type -3		Type -4		Type -5	
	N	%	N	%	N	%	N	%	N	%
<b>Males</b>	11	35.5%	5	16.1%	6	19.34%	6	19.4%	3	9.7%
<b>Females</b>	57	33.7%	30	17.8%	29	17.2%	27	16%	26	15.4%

with 35.5%, and 33.7% of females lip prints were founded with vertical pattern. Regards finger prints thumb prints for right were 61.3% with loop and less with 6.5% arch in males, similarly in females 69.8% with loop and 8.9% with arch print. Index finger with right hand shows that 51.6% with loop and 16.1% loop, this shows that both loop prints were highly recored simultaneously with all the finger and can be predict that males were having loop print. The results with left and right index finger prints were also same as thumb prints as represented in the above tables. There is an association between the gender which resulted by the loop type print and type 1 lip print. Naga supriya showed a significant relationship between branching type of a lip print and arch type of thumbprint followed by loop type thumbprint in males and females they found an association between type i and arch type of thumbprint print. The present study was to know the difference in cooperative with other studies which could be due to an uneven gender distribution and also due to heterogeneous group of population.<sup>13</sup>

## 5. Conclusion

Forensic Odontology is the forensic science that is concerned with dental evidence, their roles are to collect, preserve and interpret trace evidence, then to relay the results to the judicial authority in the form of a report. The type of lip print pattern holds potential promise as a supplementary tool for gender identification. However, the fingerprint pattern was not associated with gender.

## 6. Limitation

1. Small sample size.
2. Uneven distribution of subjects.


## 7. Source of Funding

None.

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