

## ORIGINAL ARTICLE

**Incidence of Different Type of Lip Lines among Medical Students at Prayagraj**Kaul A,<sup>1</sup> Rai RK,<sup>2</sup> Singh DK,<sup>3</sup> Gupta AK.<sup>4</sup>Professor and Head,<sup>1</sup> Associate Professor,<sup>2</sup> Assistant Professor,<sup>3</sup> Junior Resident.<sup>4</sup>

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**Abstract:**

Despite other available methods of identification studies of lip lines is emerging as a reliable tool of personal identification. The lip surface contains numerous fine grooves distributed vertically and horizontally at different inclinations to give rise to different types of lip lines. Study of lip print is called Cheiloscopy. Present study has been done to observe incidence of types of lip lines in different quadrants of lips on 200 undergraduate medical students at Moti Lal Nehru Medical College, Prayagraj. Digital images of lip lines were taken with the help of a DSLR Camera and observed using Tsuchihashi classification system. Type 1 (complete vertical) was the most common variety of lip line observed followed by Type 1' > 4 > 2 > 5 > 3 in males and Type 1' > 4 > 5 > 2 > 3 among female subjects in order of incidence. Type 1 and Type 1' lip lines were found commonly on lower lip quadrants (LL > LR) while Type 4 and Type 5 lines on upper lip quadrants (UL > UR) in most of male and female subjects. Order of incidence of different lip lines in upper quadrants (UR and UL) was Type 4 > 5 > 2 > 3 > 1' > 1 among male and Type 4 > 5 > 2 > 1' > 3 > 1 among female subjects while on lower lip it was Type 1 > 1' > 2 > 3 > 4 > 5 in male and Type 1 > 1' > 2 > 5 > 3 > 4 in female subjects.

**Keywords:** Lip lines; Identification; Cheiloscopy.**Introduction:**

'Vermilion zone' is a less keratinized muco-cutaneous area of the lips, bounded between delicate oral mucosa and keratinized skin. Fischer in 1902 was the first anthropologist to describe that lip surface contains numerous fine grooves distributed vertically at different inclinations.<sup>1</sup> Varied orientation of these lines gives rise to different patterns of lip lines which are classified by different researcher with little variation. Lip prints are as unique as fingerprints and do not change during the life of a person. In 1967, Santos was the first person to classify lip grooves.<sup>2</sup> He divided them into four types namely: Straight line, Curved line, Angled line, Sine-shaped curve. Later in the year 1970, Suzuki and Tsuchihashi classified the lip prints into following popular classes: -<sup>3,4</sup>

Type 1 (Complete vertical groove),

Type 1' (Incomplete vertical groove),

Type 2 (Branched groove),

Type 3 (Intersected groove),

Type 4 (Reticular pattern groove)

Type 5 (Irregular groove)

Study of lip prints is called Cheiloscopy. Many methods have been adopted to develop and characterize lip lines in the form of

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prints among which digital Cheiloscopy is gaining popularity due to its precise interpretation.<sup>5</sup> Since 1950, it has been presumed that such patterns on lips may be individual specific and can help towards identification specially in criminal investigation. Materials and object like cigarette buds, wine glasses etc. are frequently used to recover such lip marks. Incidence of different types of lip lines give rise to a wide horizon for researcher who claimed beyond individual identification to have race, ethnic group, blood group and sex discriminating potential.<sup>6</sup> So for it appears essential to record, observe and report the pattern of different types of lip lines and their incidence for each group of population.

**Materials and methodology:**

Study has been conducted on equal number of male and female subjects to obtain a sum of 200 total subjects. Digital images of gently swabbed lips with distilled water have been taken with the help of a DSLR Camera and observed for different types of lip lines in a clockwise manner from upper right (UR), upper left (UL), lower left (LL) to lower right (LR) quadrant of lips.<sup>7</sup> This method is hygienic, contactless and convenient to observe than application of lip gloss or lipstick or placement of glass slide as previously used and suggested by others, which can be quite laborious and may be unhygienic due to direct or indirect contact among subjects. Data of presence of different types of lip lines have been recorded and evaluated for their incidence in different quadrants of lips. Variable incidence of such lines, in percentage for each quadrant among subjects of different sexes has been tabulated for reporting purpose.

Present study is a prospective observational cross sectional study conducted on 200 undergraduate medical students of Moti Lal Nehru Medical College, Prayagraj. Youngest was of age 20 years

while oldest 25 years. After ensuring consent, equal number of male and female medical students had been chosen to obtain desired number of subjects. The digital camera produces precise and magnified lip images which are easy to observe and interpret than an old traditional method like Lipstick method and cellophane tape, white chart paper, magnifying lens, charcoal powder and brushes etc. DSLRs are digital cameras that capture images using a prism (i.e. a reflex mirror) that helps in reflecting and swiveling the light from different angles. It combines the optics and the working of a single-lens reflex (SLR) camera using an image sensor. DSLR functions give the photographer the freedom to choose any mode depending on the need. Digital images of a DSLR Camera (NIKON D 70 DX Format 6.1 effective megapixel CCD sensor, Optical Zoom 10x) mounted on a height-adjustable tripod placed parallel to the lip height in front of each subject. Images have been observed for different types of lip lines present on right and left halves of upper and lower lips with the help of a laptop/desktop<sup>8</sup>. This method is relatively easier and involved no direct or indirect physical contact with the participants.

**Exclusion Criteria:** Those subjects were excluded whose native residence is outside state of Uttar Pradesh and lip abnormalities like surgical scars, deformity or any other anatomical alteration in lip structure.

**Ethical Clearance:** Necessary approval from institutional ethical committee has been obtained before commencement of present research work (Annexure).

**Results:**

In this study lip lines were examined with the help of digital images and labeled according to Suzuki & Tsuchihashi-1970 classification system in four quadrants of lips in a clockwise manner starting from upper right to lower right quadrants among male and female subjects. Observations are presented in tabulated forms using actual number of observations and percentage with respect to equal number of male and female subjects to make total number of subjects 200.

The order of incidence of different type of lip lines was observed as 1>1'>2> 3> 4>5 among males and 1>1'> 2> 5> 3> 4 among females on both quadrant of lower lip. All types of lip line except Type 1' were observed in more number of males than females. On lower lip, Type 1 Lip lines were present in maximum number of

**Table 1. Incidence of different type of lip line on quadrants of lower lip.**

	Type of Line	Lower Left (LL)	LR	Total
Male	Type 1	Type 1 (47%)	Type 1 (46%)	(52%)
	Type 1'	Type 1' (29%)	Type 1' (18%)	(33%)
	Type 2	Type 2 (18%)	Type 2 (17%)	(20%)
	Type 3	Type 3 (14%)	Type 3 (17%)	(19%)
	Type 4	Type 4 (10%)	Type 4 (12%)	(13%)
Female	Type 1	Type 1 (40%)	Type 1 (39%)	(44%)
	Type 1'	Type 1' (35%)	Type 1' (31%)	(36%)
	Type 2	Type 2 (13%)	Type 2 (16%)	(18%)
	Type 3	Type 5 (12%)	Type 5 (10%)	(13%)
	Type 4	Type 3 (8%)	Type 3 (7%)	(08%)
	Type 5	Type 4 (6%)	Type 4 (6%)	(07%)

subjects, male (52%) > female (44%), the incidence varies slightly among quadrants (LL > LR) in both male and female subjects. Similarly, Type 1' lip lines were present more in LL than LR quadrant in both male and female subjects. Type 2 lines were found more in LL than LR in males but order is reversed in females where Type 2 lines were more in right quadrant of lower lip than left. Type 3, Type 4 and Type 5 lip lines has greater incidence toward right quadrant in males but towards left quadrant in females.

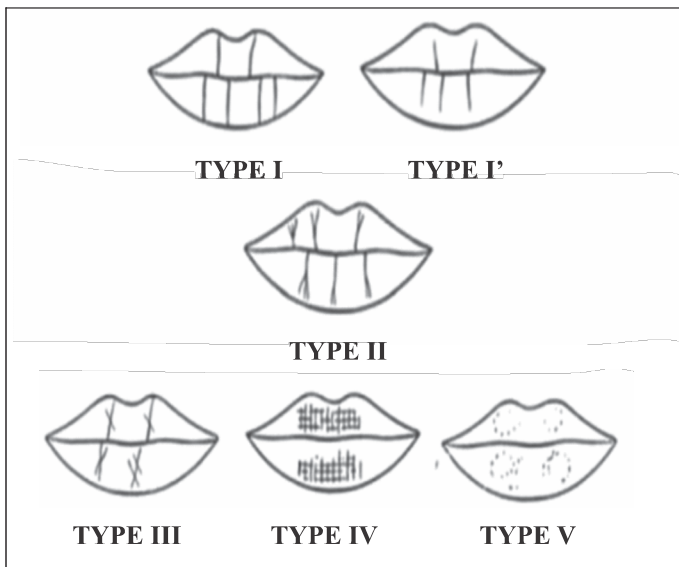
As for as upper lip is concerned, the incidence of lip lines have varied order from that of lower lip. Order of incidence was found to be Type 4>5>2>3>1'>1 among males and Type 4>5>2>1'>3 among females on quadrants of upper lip, the upper right (UR) and upper left (UL). Type 5, Type 2 and Type 3 lip lines were observed in more number of males than females while Type 4, Type 1 and Type 1' lines has higher incidence among females. On upper lip Type 4 lip lines were present in maximum number of subjects, male 33% and female 34%, the incidence varies among quadrants, upper left (UL) > upper right (UR), in both male and female subjects. Similarly, Type 5 lines were present more in UL than UR quadrant while Type 1 and Type 1' lines were present more in UR than UL in both male and female subjects. Type 2 lines have equal incidence on both UR than UL quadrant in both male and female subjects. Type 3 line have reverse order of incidence among both the sex as these lines are more common in UL quadrant in male and UR quadrant in females.

Considering all the four quadrants together, the order of incidence was found to be LL (47%) > LR (46%) > UR (12%) > UL (07%) for Type 1 lip line, LL (29%) > LR (18%) > UR (16%) > UL (14%) for Type 1', UR = UL (23%) > LL (18%) > LR (17%) for Type 2, UL (20%) > UR = LR (17%) > LL (14%) for Type 3, UL (30%) > UR (25%) > LR (12%) > LL (10%) for Type 4 and UL (26%) > UR (23%) > LR (12%) > LL (08%) for Type 5 in male subjects.

The order of incidence was found to be LL (40%) > LR (39%) > UR (18%) > UL (17%) for Type 1, LL (35%) > LR (31%) > UR = UL (17%) for Type 1', UR = UL (18%) > LR (16%) > LL (13%) for Type 2, UR (17%) > UL (14%) > LL (12%) > LR (10%) for Type 3, UL (31%) > UR (30%) > LL (8%) > LR (7%) for Type 4 and UL (23%) > UR (20%) > LL = LR (06%) for Type 5 lip lines among females.

**Table 2. Incidence of different type of lip line on quadrants of upper lip.**

	Type of Line	UR	UL	Total
Male	Type 4	Type 4 (25%)	Type 4 (30%)	(33%)
	Type 5	Type 5 (23%)	Type 5 (26%)	(30%)
	Type 2	Type 2 (23%)	Type 2 (23%)	(25%)
	Type 3	Type 3 (17%)	Type 3 (20%)	(22%)
	Type 1'	Type 1' (16%)	Type 1' (14%)	(17%)
	Type 1	Type 1 (12%)	Type 1 (07%)	(12%)
Female	Type 4	Type 4 (30%)	Type 4 (31%)	(34%)
	Type 5	Type 5 (20%)	Type 5 (23%)	(26%)
	Type 2	Type 2 (18%)	Type 2 (18%)	(21%)
	Type 1	Type 1 (18%)	Type 1 (17%)	(19%)
	Type 1'	Type 1' (17%)	Type 1' (17%)	(18%)
	Type 3	Type 3 (17%)	Type 3 (14%)	(18%)



### Discussion:

Personal identification is defined as the 'Establishment of the identity of an individual'. Identification techniques play a crucial role in the management of dead bodies in situations of natural calamities and disasters like earthquakes, tsunamis, air crashes, landslides, terrorist attacks etc. Nearly all criminal investigations need precise, reliable and admissible identification techniques to pinpoint criminals and terrorists for the administration of justice by quality prosecution. Lip lines manifest in intrauterine life (6<sup>th</sup> week) and remain constant during the lifetime of an individual.<sup>9</sup> Lip patterns recover even after trauma, inflammation and the diseases like herpes which can be recognized without difficulty.<sup>4</sup> Cheiloscropy i.e. study of lip prints have shown enormous potential towards personal identification.

Present study has adopted quadrant method for evaluation of lip print i.e. division of lip region into four quadrants which was also implicated by Gondivkar et al. (2009), Saraswathi et al.<sup>10</sup> (2009), Satyanarayana et al. (2011), Gupta et al. (2011), Venkatesh and David<sup>11</sup> (2011), Prabhu et al.<sup>5</sup> (2012), Koneru et al.<sup>12</sup> (2013) in India and Tsuchihashi<sup>3,4</sup> (1974), El Domiaty et al.<sup>13</sup> (2010), and some other researchers across the globe. Aditi et al. (2022), Vats Y et al. (2013), Hassan FZ et al. (1977) have opted for 6 quadrants division, Augustine J et al (2008) for 8 quadrants, Jagmeet Kaur et al. (2021) and Adamu LH et al.<sup>14</sup> (2013) for 10 quadrants division of lips.

Similar to our observation Type 1 i.e. vertical complete lines, are mentioned as most common observed lip lines in studies of Vijay Kautilya D et al. (2013), Koneru et al.<sup>12</sup> (2013), Vahanwala and Parekh,<sup>15</sup> (2000), Kapoor N et al.<sup>16</sup> (2015), Sanya et al. (2021), Priyanka Ghalaut et al. (2012) Pratibha et al.<sup>17</sup> (2020) in India and by Neo et al.<sup>18</sup> (2012) in Malaysia, Ragab et al. (2013) in Egypt and Ishaq et al. (2018) in Pakistan. The range of incidence of Type 1 lip lines varies from 30% to 64% in these studies which is also verified in present study as 52% male and 44% female have shown Type 1 line. On the contrary, Rao B et al. (2014), Kumar et al. (2016) reported Type 4, reported as the commonest lip line in

India and Abdel Aziz et al. (2016) reported Type 3 as the most common variety observed in Malaysian and Egyptian population. We found all type of lines more common in males similar to what reported by Koneru et al. (2013), Kapoor et al.<sup>12</sup> (2015) and Saraswathi TR et al.<sup>17</sup> (2009), on the contrary, reported that the incidence of Type 1 line is more among females. Aditi et al.,<sup>18</sup> (2013) also reported Type 5 as the most predominant line among male and female subjects.

Type 4 lines are seen in majority of subjects on the upper lip in present study which is in agreement with studies of Kumar et al. (2016) however K. Srinivasulu et al. (2020), Ghimire et al.<sup>19</sup> (2013) Nishi R. et al.,<sup>20</sup> (2018), reported Type 1 line as the most common line on the upper lip followed by Type 2. Kapoor et al. (2015) reported Type 2 line as the most common line on the upper lip followed by Type 1.

Majority of researches i.e. Nishi R. et al.,<sup>20</sup> (2018), K. Srinivasulu et al. (2020) have reported that the order of incidence of different lip lines is almost identical for right and left quadrants including present study, indicating bilateral symmetry among both half of a single lip.

### Conclusion:

Lip prints are present since birth and remain till life in unaltered form which can be used for identification like finger prints. Incidence of different types of lip lines varies among populations and can be a potential tool for determination of sex, ethnic group, race. The time has now arrived to explore the ways to reach out the destination in the form of a reliable human identification technique using lip lines. Further studies are needed with larger sample size to verify and to add further data. The identification data which can be useful for society should be prompt, precise and at the same time secured and computerized. Presently, biometric data of fingerprint and iris or face scan are serving the purpose but collection and preservation of biometric data have significant financial implications with it to arrange sophisticated scanning instruments, computers and manpower along with expensive servers for its storage.

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