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Morphological patterns of lip prints in Saudi Arabia at Almadinah Almonawarah province

Magda Ahmed El Domiaty *, Sami Awda Al-gaidi, Ahmed Abdelmoneim Elayat, Maha Diaa Eldein Safwat, Sherief Ahmed Galal

Anatomy, Taiba University, Almadinah Almonawarah, Saudi Arabia

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ABSTRACT

In the past decades, lip-print studies (cheiloscopy) attracted the attention of many scientists as a new tool for human identification in both civil and criminal issues. The present work aimed to study in depth the lip prints of Saudi individuals (males and females) in Almadinah Almonawarah province. It is the first chieloscopic study done on Saudi individuals. A total of 966 Saudi persons, including 13 identical twins and 19 families, were included in the study. Red or brown lip sticks, white copy papers and tissue papers were used to take the impressions of the lips by different methods. Each lip print was divided into six topographic areas, examined by magnifying hand lenses, then photographed and examined by the picture manager and fax viewer programs. A modification of the Renaud's classification 1973 was used to classify the types of grooves and the results were statistically analysed. Throughout the whole work, no identically similar lip-print pattern appeared in two subjects. Few prints (9.63% of both sexes) showed one type of grooves in all areas of the lips (12.59% of females and 5.87% of males), but two or more types of grooves were commonly seen in different areas of the print. A total of 72.67% of prints showed the same groove pattern in the upper right and upper left areas (78.89% of females and 64.79% of males), while 75.36% of the prints showed the same groove pattern in the lower right and lower left areas (74.81% of females and 76.06% of males). Nine types of grooves were recorded in Saudi lips. The groove type, horizontal with other forms, was the highest recorded (68.7% in females and 42.7% in males) followed by the complete bifurcated, complete branched, reticular, complete vertical, incomplete bifurcated, X or comma form, incomplete vertical, in descending order. The horizontal type was the least recorded one and appeared only in females. Dissimilar lip-print patterns were detected among different individuals of families. Non-identical lip-print patterns were recorded in identical twins. The present study described in detail the lip-print patterns of both males and females at Almadinah Almonawarah province and confirmed that the lip-print pattern is unique for each individual even in twins and family relatives. According to this finding, it is recommended to establish a database for all individuals in a certain locality, hoping to be a reference in civil litigations and criminal cases.

1. Introduction

Establishing a person's identity is a very important process in civil and criminal cases. Dental, fingerprint and DNA comparisons are probably the most common techniques allowing fast and secure identification processes. However, in certain circumstances related to the scene of the crime or due to lack of experienced personnel, these techniques might be unavailable, so there is still an increasing need for reliable alternative methods of establishing identity [1].

In the past decades, the lip-print studies (cheiloscopy) attracted the attention of many scientists who declared the possibility of their use in the matter of human identification [2]. The lip prints are the normal lines and fissures in the zone of transition of human lip between labial mucosa and the outer skin. They are identifiable as early as the sixth week of intrauterine life, and from that time on, their pattern rarely changes, resisting many afflictions such as herpetic lesions [3–5]. Analysis of the lip prints left at a scene of crime, and their comparison with those of the suspected person may be useful for identification [6,7].

Many studies dealt with the possibility of uniqueness of the lip prints, comparable with the fingerprints, and the possibility of the presence of species and gender differences. These studies pointed out that if this uniqueness and specificity were proved, the lip prints might be an important tool for identification [8]. Santos [9] suggested that the fissures and lines in the lips could be divided into two different groups (simple and compound), and each group

* Corresponding author. Tel.: +96 6559579980; fax: +96 6048460088.
E-mail address: dr_majda@hotmail.com (M.A.E. Domiaty).

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was further subdivided into eight subtypes, whereas Suzuki and Tsuchihashi [10] considered six different types of grooves: complete vertical, incomplete vertical, branched, intersected, reticular and irregular pattern. Renaud [11] studied the lips in halves (left and right), and classified the grooves according to their form into 10 types (complete vertical, incomplete vertical, complete bifurcated, incomplete bifurcated, complete branched, incomplete branched, reticular, X or comma form, horizontal and the 10th type was specified for any other form). This classification was considered by Caldas et al. [1] as the most complete classification. It is recorded that all lip prints are important, even the invisible and the latent ones. The identification of latent print evidence is often considered the key in solving a crime and they should always be considered when processing a crime scene, even if there are no traces of lipstick [12,13].

Studies regarding lip prints are rather few in spite of their possible prominent help as useful evidence in forensic medicine [14]. If unique, it seems that a great effort should be made to record the lip prints of all individuals in a certain location so as to establish a database that might be of great value in civil and criminal issues.

The present work aimed, on the one hand, to study in depth the patterns of lip prints of Saudi individuals (males and females) at Almadinah Almonawarah province and, on the other hand, to focus attention on lip-print patterns of twins and families, hoping that this study might be of value in the identification process in both civil and criminal issues.

2. Materials and methods

2.1. Subjects

All subjects included in this study were Saudi residents of Almadinah Almonawarah area. Informed consent was taken from each of them. A total of 540 females and 426 males (aged from 18 to 40 years), 13 identical twins of different ages and 19 families were included in the study.

Lips which showed any inflammation, cicatrisation or deformity were excluded from the study.

2.1.1. Recording the lip prints

Red or brown, non-persistent, non-glossy, non-metallic Lise Watier or Black Up lip stick were used to get clear lip prints. White papers (white A4 ROCO Premium 80-g copy papers) and tissue papers (Kleenex) were used to take the impressions of the lips.

A thin film of lipstick was applied onto cleaned and dried lips, left for 3 min, and then the impressions of the lips were taken on the specified papers.

The following methods were used for taking the impressions from every subject:

(a) Direct light pressure was applied by the lips on a folded paper [15].
(b) Rolling the paper onto the lips with applying slight, gentle pressure onto the lip taking the print of the upper lip from one angle of the mouth to the other; then the print of the lower lip was taken starting from the other angle and rolled to the first one. The lips must be relaxed and slightly separated during the manipulation [14,16].

Besides this, a third method was used by applying direct light pressure of slightly separated lips on a paper put on a hard surface.

At least eight prints were taken from each person to be sure that we had at least one complete print sufficient for examination and identification of various areas of the lip, and to avoid subjective different pressure applied to the lip.

2.1.2. Examination of the prints

The lip print was divided into six topographic areas (each lip was divided into three areas) and each area was studied alone to determine the type of the grooves: a transverse line was drawn between the two highest points of the philtrum angles, two perpendicular lines were drawn on that transverse line at the points of its meeting with the angles of the philtrum. The perpendicular lines were extended to cut the upper and lower lips. Therefore, each lip print was divided into the following six areas: upper right (UR), upper middle (UM), upper left (UL), lower right (LR), lower middle (LM) and lower left (LL) [16] (Fig. 1). During the analysis of prints, the most lateral part of the lip print (near the angles of the mouth) was excluded as it was usually wrinkled.

In the male specimens, it was occasionally difficult to determine the philtrum (usually masked by the moustache), so the middle area of each lip (about 15 mm) was considered as upper middle and lower middle areas.

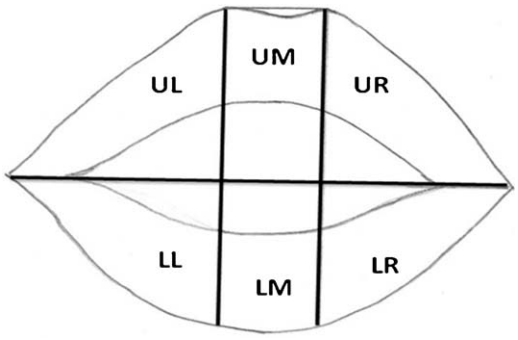

Fig. 1. A diagram showing the topographic areas of the lip. UR, upper right; UM, upper middle; UL, upper left; LR, lower right; LM, lower middle; LL, lower left.

The obtained prints were first examined by magnifying hand lenses (with direct light focused on it) to choose the best clear complete print where the groove types could be analysed.

Only the best complete print of each individual was photographed by a digital camera (Nikon 300 D 12.5 MP) and examined by the picture manager and the fax viewer programs for the predominant groove type in the specified areas.

The lip prints were studied based on the classification of Renaud [11] into 10 types, but the 10th type (J) was modified in this study to match for the horizontal with other forms as it was present in large number of prints. Therefore, the used classification was as follows: A = complete vertical, B = incomplete vertical, C = complete bifurcated, D = incomplete bifurcated, E = complete branched, F = incomplete branched, G = reticular pattern, H = X or comma form, I = horizontal, J = horizontal with others forms (vertical, bifurcate or branching) (Fig. 2). The study did not differentiate the bifurcation of the grooves whether upward or downward as they were found together in the same area.

The lip-groove types of each print were recorded and kept in a specific folder to be examined for the individuality. Then, the data were statistically analysed.

For determining the individuality of the lip print, the folders of the prints were classified regarding a specific groove types in specific areas of the lip. First, we choose the J type in the upper middle area as it showed high incidence in this area, then we choose other types in other specific areas. The prints that exhibited the same groove type in the same area were differentiated by the types of grooves in other areas and so on. The prints that express the same groove types in all areas of the print were re-examined by the computer to assure their difference in the site, length, angles and/or the pattern of branching of the groove.

2.1.3. Statistical analysis

All data were analysed statistically, using a current SPSS statistical package Version 13 for determining the frequencies of the pattern types in each area of the lip, frequencies of the pattern types in each sex and for comparison between males and females regarding upper and lower lip.

3. Results

Throughout the whole work on 966 Saudi persons (540 females and 426 males), no identically similar lip-print pattern appeared in

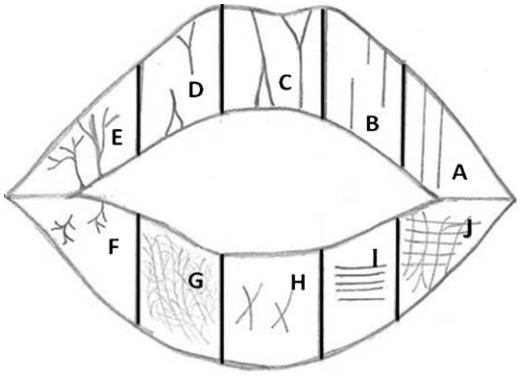

Fig. 2. A diagram showing the lip-groove types: A = complete vertical; B = incomplete vertical; C = complete bifurcated; D = incomplete bifurcated; E = complete branched; F = incomplete branched; G = reticular pattern; H = X or comma form; I = horizontal; J = horizontal with other forms (vertical, bifurcate or branching).

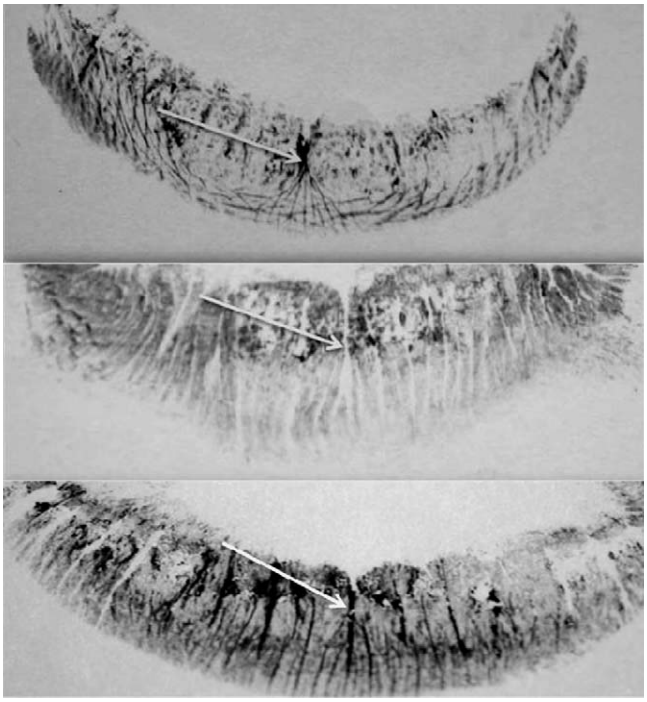

Plate 1. Photographs of lower lip prints of three Saudi individuals having the same groove type (complete branched) in the lower middle area but with different patterns of branching (arrow).

two subjects. However, more than one subject showed the same groove types in the same areas of the lip. In those having one or more similar types of grooves in the same areas, specificity of groove pattern was evidently present in either the site or the pattern of branching or reticulation of the groove (Plate 1).

Few number of prints (9.63% of both sexes) showed one type of groove in all areas of the lip (12.59% of females and 5.87% of males), but two or more types of grooves were commonly seen in different areas of the print.

It was found that 72.67% of prints (702 subjects) showed the same groove pattern in the UR and UL areas (78.89% of females and 64.79% of males). Further, 75.36% of prints (728 subjects) showed the same groove pattern in the LR and LL areas (74.81% of females and 76.06% of males).

The lips of the studied persons at Almadinah Almonawarah area showed nine types of grooves. These included A (complete vertical), B (incomplete vertical), C (complete bifurcated), D (incomplete bifurcated), E (compete branched), G (reticular), H (X or comma form), I (horizontal) and J (horizontal with other forms). Type F (incomplete branched) was not recorded in Saudi lips in this study. The type J is a new recorded pattern in this study where the horizontal grooves were accompanied by an other type of groove (vertical, bifurcate or branching). The study did not differentiate the bifurcation of the grooves whether they were upward or downward as they were found together in the same areas (Figs. 3–14).

Frequency of pattern types on different topographic areas of the lips: (Table 1)

- *Area 1 (upper right area)*: The groove types J and C showed the highest frequency in both sexes but type J was higher in females (39.8% in females and 23.9% in males), whereas type C was higher in males (24.1% in females and 32.6% in males). This was followed by types G (17.4% in females and 19.5% in males) and E (14.3% in females and 19.2% in males). The types A, B and I were not recorded in males and showed low frequency in females. The other types showed low frequency in both males and females.

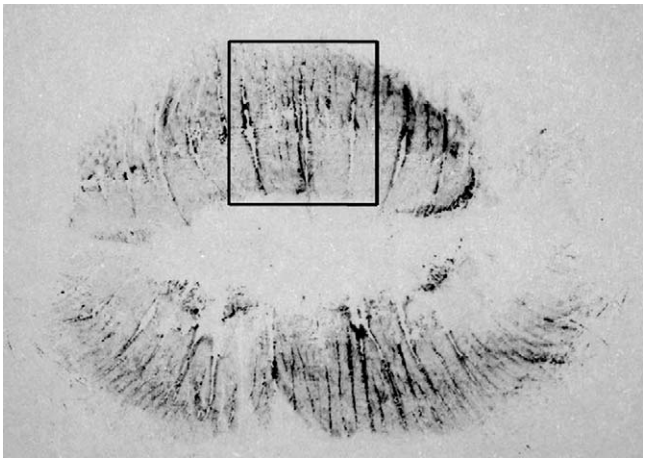

Fig. 3. A photograph of Saudi male lip print showing groove type A (complete vertical) in the upper middle area of the lip.

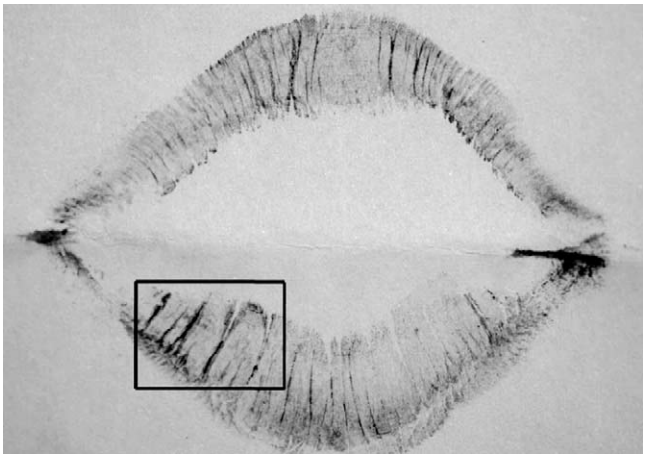

Fig. 4. A photograph of Saudi male lip print showing groove type C (complete bifurcated) in the lower left area of the lip. Note the bifurcation is directed either upward or downward.

- *Area 2 (upper middle area)*: The groove types J and C showed the highest frequency in both sexes (type J was 68.7% in females and 42.7% in males, whereas type C was 12.0% in females and 30.3% in males). This was followed by types A (7.4% in females and 10.3% in males) and E (3.5% in females and 6.1% in males). The other

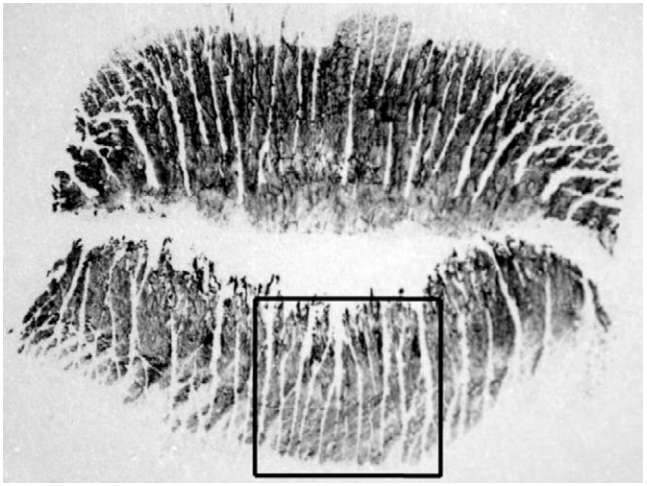

Fig. 5. A photograph of Saudi male lip print showing groove type E (complete branched) in the lower middle area of the lip.

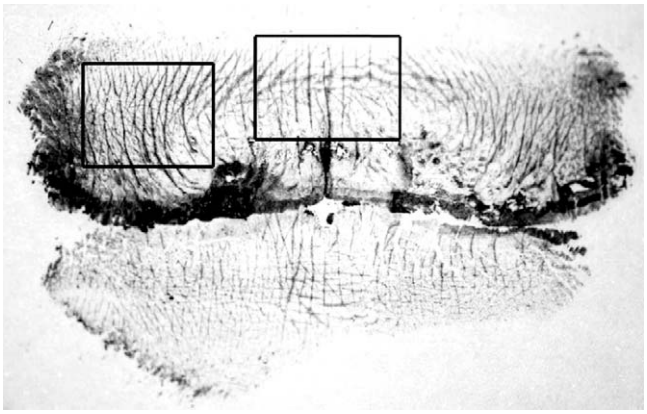

Fig. 6. A photograph of Saudi male lip print showing groove type G (reticular) in the upper left area and groove type J (horizontal with other forms) in the upper middle area.

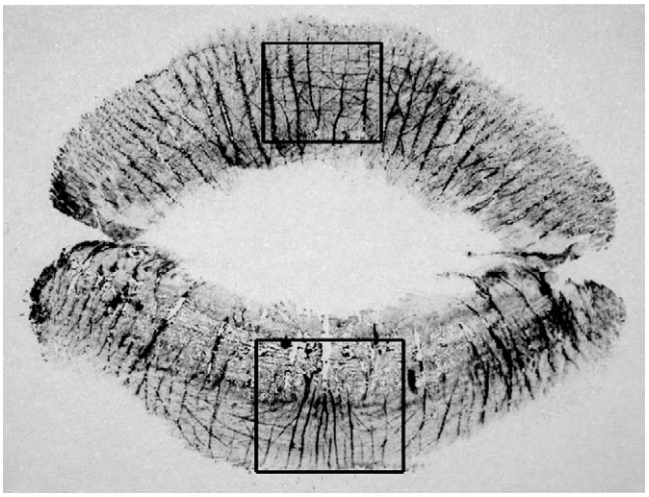

Fig. 7. A photograph of Saudi male lip print showing groove type J (horizontal with other forms) in the upper middle area and groove type E (complete branched) in the lower middle area of the lip.

types showed low frequency in both males and females but type I was not observed in males.

- *Area 3 (upper left area)*: The groove types J and C showed the highest frequency in both males and females (type J was 43.5% in females and 27.2% in males whereas type C was 23.0% in females and 24.6% in males), followed by types G (15.9% in females and 19.2% in males) and E (13.0% in females and 18.1% in males). The

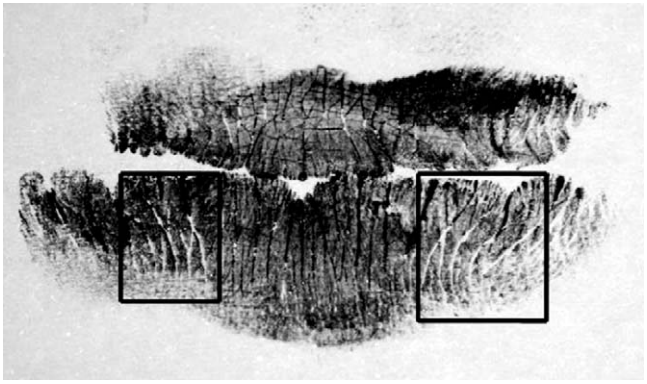

Fig. 8. A photograph of Saudi male lip print showing groove type H (X form) in the lower right and lower left areas of the lip.

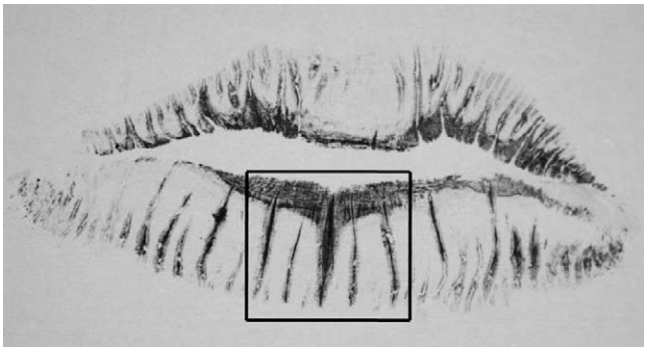

Fig. 9. A photograph of Saudi female lip print showing groove type A (complete vertical) in the lower middle area of the lip.

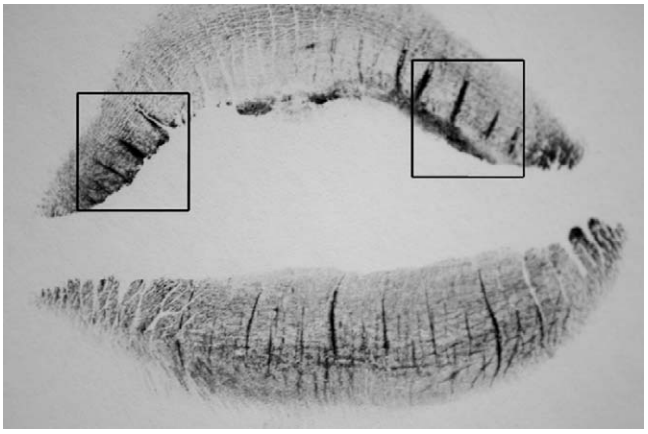

Fig. 10. A photograph of Saudi female lip print showing groove type D (incomplete vertical) in the upper right and upper left areas of the lip.

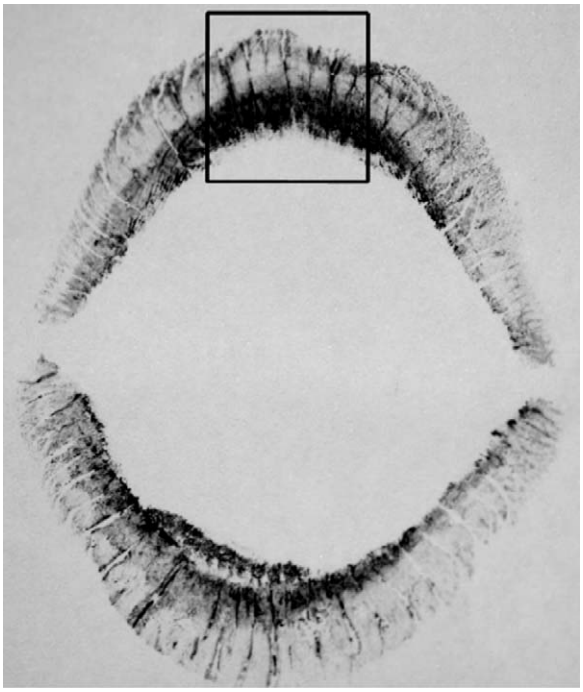

Fig. 11. A photograph of Saudi female lip print showing groove type C (complete bifurcate) in the upper middle area of the lip.

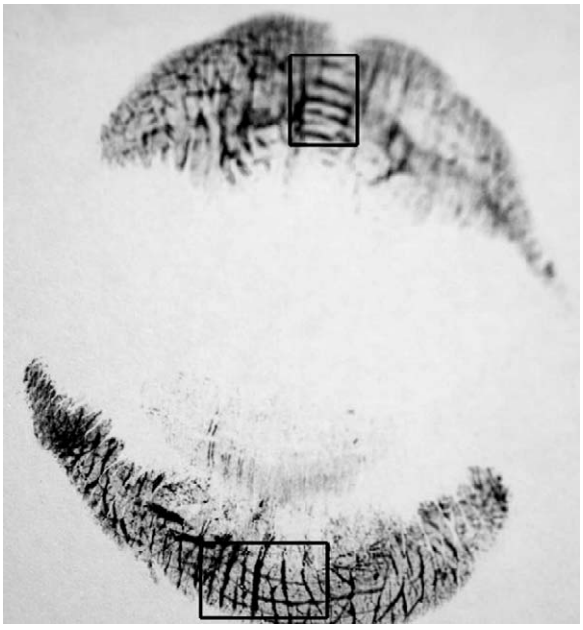

Fig. 12. A photograph of Saudi female lip print showing groove type I (horizontal) in the upper middle area and groove type J (horizontal with other forms) in the lower middle area.

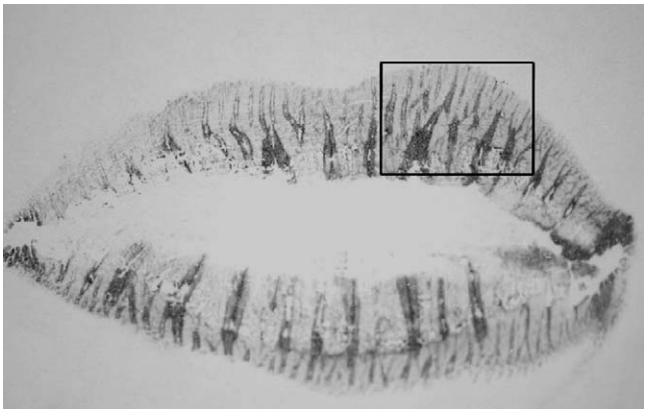

Fig. 13. A photograph of Saudi female lip print showing groove type D (incomplete bifurcate) in the upper right area of the lip.

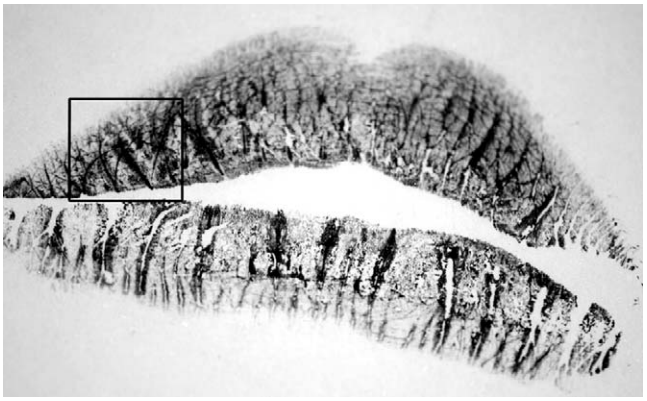

Fig. 14. A photograph of Saudi female lip print showing groove type H (X form) in the upper left area of the lip.

other types showed low frequency in both males and females but type I was not recorded in both sexes.

- *Area 4 (lower right area)*: The types C and E showed the highest frequency in both sexes (type C was 41.9% in females and 35.9% in males, whereas type E was 26.9% in females and 28.9% in males), followed by type G (14.1% in females and 18.8% in males) and then J (10.7% in females and 7.0% in males). Type B was not observed in males where as type I was not recorded in both males and females. The other types showed low frequency in both sexes.
- *Area 5 (lower middle area)*: The groove type C showed the highest frequency in both sexes (33.3% in females and 29.8% in males) followed by type J in females (31.5%) but type E in males (24.9%). Type A represents 11.1% in females and 13.1% in males). The other types showed low frequency in both males and females but type I was not recorded in both.
- *Area 6 (lower left area)*: The groove types C and E showed the highest frequency in both sexes (type C was 40.6% in females and 33.8% in males, whereas type E was 25.0% in females and 31.9% in males) followed by type G (15.5% in females and 18.3% in males) and then J (10.9% in females and 7.3% in males). Type B was not observed in males where as type I was not recorded in both males and females. The other types showed low frequency in both sexes.

It was noticed that the groove types J and C were the predominant types throughout the whole upper lip areas (UR, UM and UL areas), while types C and E were the predominant types in the LR and LL areas.

Table 1
Frequency of pattern types %.

Areas	Sex	Frequency of pattern type %									
		A	B	C	D	E	F	G	H	I	J
Upper right (UR)	Male	–	–	32.6	2.6	19.2	–	19.5	2.1	–	23.9
	Female	2.0	0.2	24.1	0.9	14.3	–	17.4	1.1	0.2	39.8
Upper middle (UM)	Male	10.3	1.6	30.3	4.5	6.1	–	3.1	1.4	–	42.7
	Female	7.4	0.6	12.0	1.3	3.5	–	4.6	0.9	0.9	68.7
Upper left (UL)	Male	4.0	0.5	24.6	3.5	18.1	–	19.2	2.8	–	27.2
	Female	1.7	0.4	23.0	1.1	13.0	–	15.9	1.5	–	43.5
Lower right (LR)	Male	3.3	–	35.9	4.5	28.9	–	18.8	1.6	–	7
	Female	1.1	0.2	41.9	4.1	26.9	–	14.1	1.1	–	10.7
Lower middle (LM)	Male	13.1	1.9	29.8	7.0	24.9	–	4.0	1.6	–	17.6
	Female	11.1	2.2	33.3	3.9	10.0	–	7.0	0.9	–	31.5
Lower left (LL)	Male	1.9	–	33.8	6.3	31.9	–	18.3	0.5	–	7.3
	Female	1.5	0.7	40.6	4.3	25.0	–	15.5	1.7	–	10.9

Table 2
The highest frequency % of groove types.

Type	Male	Area	Female	Area
J	42.7%	UM	68.7%	UM
C	35.9%	LR	41.9%	LR
E	31.9%	LL	26.9%	LR
G	19.5%	UR	17.4%	UR
A	13.1%	LM	11.1%	LM
D	7.0%	LM	4.3%	LL
H	2.8%	UL	1.7%	LL
B	1.9%	LM	2.2%	LM
I	–	–	0.9%	UM
F	–	–	–	–

Frequency of groove types representation: (Table 2) (Fig. 15, as an example of graph representation of the upper middle area).

The highest frequency of groove types in both males and females are summarised in Table 2.

- The groove type J was the highest recorded type. It was most frequently represented in the upper middle area in both males and females.
- The groove type I was the least recorded type and was represented only in the female upper lips.
- The groove type F was not recorded in any of the Saudi lips included in this study.

Examination of prints of 19 families showed that lip prints were dissimilar among different individuals (Plate 2). Furthermore, examination of 13 identical twins showed some similarity in the groove types but the lip patterns were not identical (Plate 3).

A very common feature of the lips of Saudi subjects was the peeling of the superficial layers of the skin in some parts of the red area of the lips. In these cases, no lip grooves were observed in the first recorded impressions of lips, but the grooves appeared in these areas after successive lip-print recordings (Plate 4).

Apparently different lip prints appeared during taking the impressions of the lips of the same subject, but specificity of groove pattern in the same site of the lip was evidently seen (Plate 5).

As a tradition, Saudi males usually have moustaches; an apparent feature in this study was that a large number of male prints could not show the philtrum of the lip.

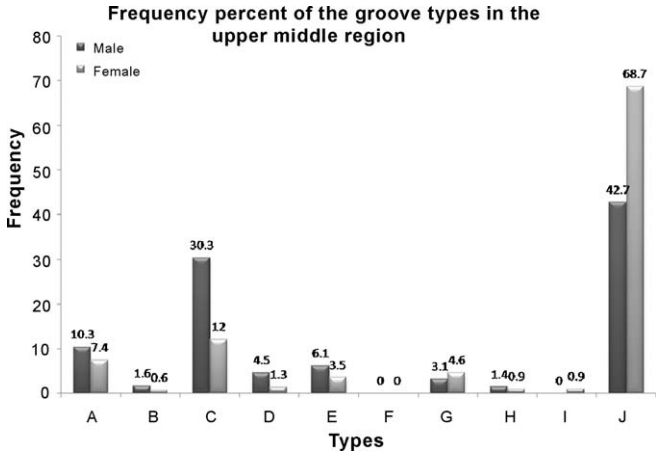

Fig. 15. Frequency percent of lip-groove types of both males and females in the upper middle area.

Generally, the lip prints taken on white A4 ROCO Premium 80-g copy papers were clearer to be examined and photographed than those taken on the tissue papers. The use of non-metallic, non-glossy lipsticks brought clear non-luminous and easily examined photographs. Moreover, the prints taken by the direct light pressure on a paper put on a hard surface, or by rolling the paper onto the lips from one angle to the other were better for examination than those taken by applying light pressure by the lips on the folded paper.

4. Discussion

The present study is the first detailed cheiloscopic study describing the lip-print patterns in Saudi males and females. This study proved the individuality of Saudi lip prints as no identically similar lip-print patterns appeared in two subjects. Even when two subjects exhibited the same type of groove in the same area of the lip, there was specificity in the site and pattern of groove branching or reticulation. The study described nine types of grooves constituting the lip-print pattern: eight of them were the same types as described by Renaud [11] while the last was the newly recorded one in the present work (type J), characterised by the

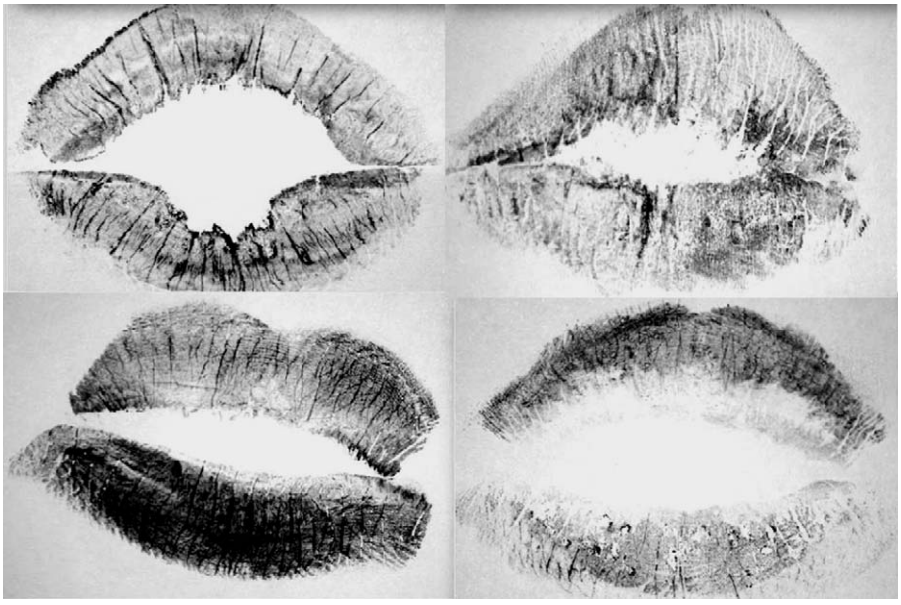

Plate 2. Photographs of lip prints of four individuals of one Saudi family showing dissimilar lip print patterns.

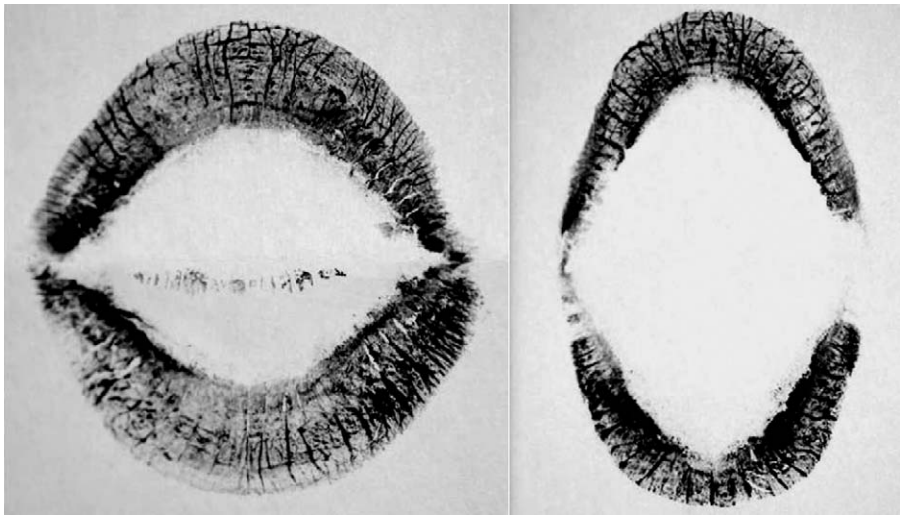

Plate 3. Photographs of lip prints of identical twins showing some similarity in the groove type in the upper lips, but the lower lips showed different groove types.

presence of the horizontal grooves with other type of the grooves. Few numbers of prints (9.63%) showed one type of grooves in all areas of the lip, but two or more types of grooves were commonly seen in different areas of the print.

These results are in accordance with other researches done on different populations from 1950 till 2007 which reported that lip prints had different patterns that were apparently unique to the individuals. Suzuki [17] and Tsuchihashi [18], after examining lip prints of Japanese subjects, concluded that, although the lip print consisted of a combination of various types of grooves, no two lip prints were identical. Suzuki and Tsuchihashi [19], proved that lip prints could be definitely used in criminal cases. Moreover, Williams [20] reported that the lip-print characteristics could be used for identification similar to finger prints, palm prints and foot prints. Recently, Aggrawal [15] had reported that the fissures and the criss-cross lines on the lips are different in different people and could form a very important basis of identification at many times.

More or less similar work was done by Uma Maheswari [14], who proved the individuality of lip prints in people in Chennai, India. However, in contrast with this study, she reported that no one had a single groove type in all compartments of the lip. Furthermore, Caldas et al. [1] confirmed that the lip grooves might be used successfully in human identification due to their special unique features. On the other hand, in a cadaveric study, Utsuno et al. [21] concluded that, even after fixation, a satisfactory identification rate could be achieved from examination of the lip prints.

The present work showed that, type J (horizontal with other forms) and type C (complete bifurcate) are the most prevalent types in the examined Saudi males and females. Their highest representation was in the same areas in both sexes (UM area for the type J) and (LR area for the type C). In other populations, the predominance of the groove patterns differed. In Egyptians, the reticular pattern of grooves was the prevalent types in Lower Egypt, while the complete vertical was the prevalent type in Upper Egypt [16]. The authors reported that in Egyptians, 11.90% of subjects showed one pattern in all areas of the print, while in this study, only 9.63% of Saudi subjects showed one pattern in all areas of the print. In India, Vahanwala and Parekh [22], after conducting a study of lip patterns of 50 male and 50 female Indian subjects in the age group of 19–20 years, concluded that the lip prints were unique and that Y-shaped and end-to-end patterns were the most frequently seen. They also reported that 52% of individuals have at least the same pattern in two quadrants, equally distributed in both males and females. In the present study, a higher percentage of individuals showed the same pattern in two areas (72.67% in the

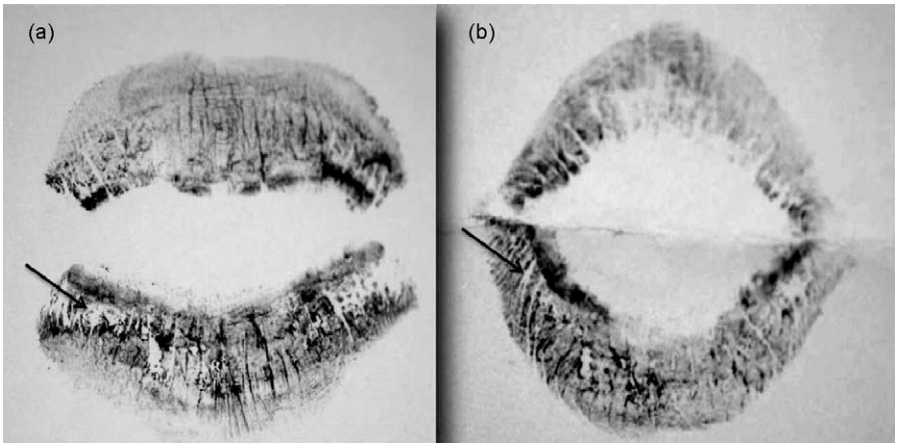

Plate 4. Photographs of lip prints of one Saudi subject showing the effect of dry weather in Almadinah Almonawarah area on the lip print: (a) The first taken lip print from the subject, showing unapparent groove pattern in the peeled superficial parts of the skin in the lower lateral area of the lip. (b) The fifth taken lip print from the same subject showing apparent groove patterns in the same area.

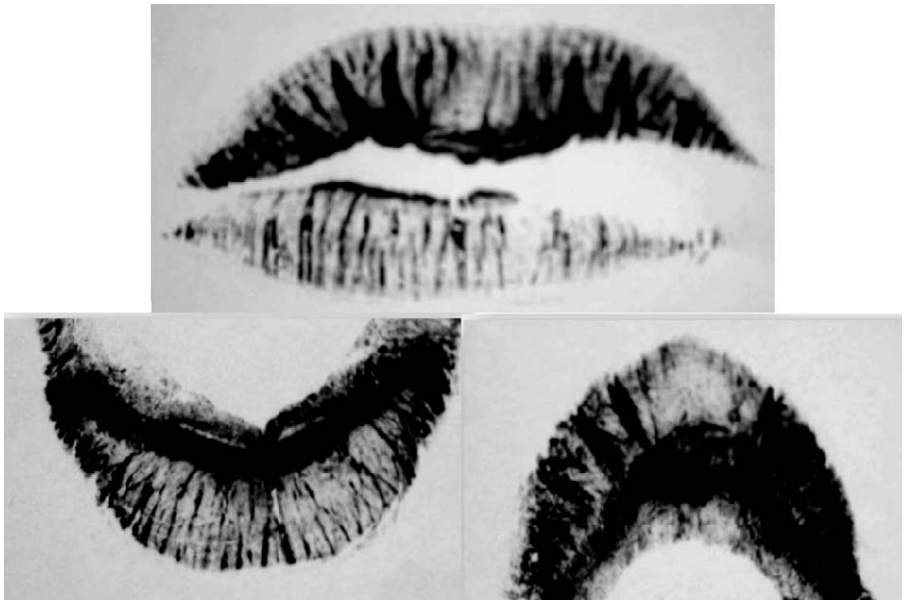

Plate 5. Photographs of two lip prints of one Saudi subject showing the effect of different pressure applied to the lip during recording of the lip prints. The upper lips are apparently different but the lower lips showed grooves with the same bifurcation pattern.

upper lip and 75.36% in the lower lip). Further, Vahanwala and Parekh [22] reported that, individuals with all quadrants having different patterns were commonly males, while in females, the same pattern were commonly seen in all quadrants. In contrast to our results, they found that the dominant type in females differed from that in males and was also not represented in the same area.

In the present study, examination of prints of 19 families showed that lip prints were dissimilar among different individuals. Furthermore, examination of 13 monozygotic twins showed some similarity in the groove types but the lip-print patterns were not identical. The findings of this study are in accordance with those of Suzuki and Tsuchihashi [23], who after carrying out a longitudinal study on 107 Japanese families, proved dissimilarity among individuals and suggested that the lip-groove pattern could be influenced by hereditary factors. On the other hand, Suzuki and Tsuchihashi [24], after analysing lip prints of 280 Japanese individuals using the photographic method and magnifying lenses, recorded that there was no hereditary pattern of lip prints and that dissimilarity did not evidently exist between twins. Soon after, Tsuchihashi [18], after analysing lip prints of 49 pairs of uniovular Japanese twins and their parents, reported that lip prints of twins and their parents were not absolutely identical. However, Uma Maheswari [14] concluded that no similarities were found between parents and their twins and between twins. She also added that no similarities were seen between triplets.

A common feature of the lips in this study was the presence of peeling off the superficial layers of the skin in some parts of the red area of the lip in both males and females. This could be due to the dry weather in this area of the Kingdom, which dried the lips and made the people accustomed to bite away the dried skin. However, this did not mask the pattern of the lip print as it appeared after taking the print many times. This phenomenon could help a great deal in identification of subjects as the lip pattern is permanent and does not change due to differences in climate or any illness present around the mouth [18].

This study reported that apparently differently shaped lip prints could be recorded by the same subject. This might be due to different pressure applied to the lip during recording of the print or due to different amount of the recording material. Pueyo et al. [25] and Ball [8] explained this phenomenon by the fact that the lip print is produced by a substantially mobile portion of the lip and so the same person can produce different lip prints according to the pressure, direction and method used in taking the print. They suggested that this problem can be solved if successive recordings are made until all of the recording substance is used.

Regarding the methods of taking the prints in the present work, it was found that the white A4 ROCO Premium 80-g copy papers were better than the tissue papers for taking the impressions and for photographing the prints. This was in accordance with Ball [8], who stated that the lip prints present on the non-porous surfaces are better to be photographed and magnified. In the same time, the red or brown, non-glossy, non-metallic lip stick conveyed clear lip print, while the glossy or the metallic lip sticks brought apparently good prints but their photographs were luminous and not clear for examination. The newly developed persistent lipsticks are not suitable for using in such studies as they do not leave visible smears or marks when they come in contact with different items [26].

5. Concluding remarks

The study revealed a special pattern of lip prints in Saudi individuals and discussed its sex differences. This study proved that the lip print pattern is unique for each of the examined individuals, even in twins and family relatives. This finding is hoped to be useful in the identification process, both in civil and criminal issues. It is suggested to establish a database for all individuals in a certain locality so as to be a reference in the criminal investigations.

Further studies concerning standardisation of the pressure applied to the lip during recording the prints is recommended to allow fast and accurate assessment of lip-print patterns.

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