

EXPLORING THE ASSOCIATION BETWEEN DERMATOLGYPHIC PATTERNS AND OCCURRENCE OF ORAL SUBMUCOUS FIBROSIS - A CASE CONTROL STUDY

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ABSTRACT-

Background and objectives:

Dermatoglyphics is a newer science of forensic based study involving the fingertip and palmar prints. In the field of dentistry dermatoglyphics has been used to unveil various oral diseases like precancerous lesion, malocclusion, dental caries, cleft lip and palate etc. Hence with the help of dermatoglyphics we can explore the association between various dermatoglyphic patterns and occurrence of Oral submucous fibrosis.

Methodology:

A total of 60 participants (30 Oral submucous fibrosis patients and 30 healthy controls) were included in the study. Tobacco habits was recorded for all the participants. All the participants in the study were examined for intra oral findings. Dermatoglyphic patterns were also recorded.

Results:

There was significant increase in the whorl pattern among Oral submucous fibrosis group (55.8%), whereas in control group loop pattern (66.6%) was found to be significantly increased ($p < 0.05$). Dat angle was also significantly increased in Oral submucous fibrosis group.

Conclusion:

Whorl type of fingerprint pattern and dat angle found in our study would probably be served as a candidate screening marker for susceptibility to oral submucous fibrosis in general population.

Keywords :

Oral submucous fibrosis, Dermatoglyphics, finger print patterns.

INTRODUCTION-

Skin is a thin layer of tissue forming the natural outer covering of the body of a person or animal and considered as the largest and delicate organ of the human body and performs many vital functions in life. The most conspicuous are the creases of the skin.[1]Dermatoglyphics (Derma=skin, Glyph= Carving) is a newer science of forensic based study involving the fingertip and palmar prints. The term dermatoglyphics was coined in 1926 by Cummins and Midlo.[2] Cummins is considered to be the father of dermatoglyphics. Dermatoglyphic patterns are genetically determined and remain unchanged from birth to death and are therefore considered a stable marker that once formed remain same throughout a person life[3]. Studying different types of dermatoglyphic pattern can determine a number of parameters, which could be helpful in diagnosing and treatment of various diseases. Thus, it is considered to be an important tool in assessing the genetic trait, evaluation of children with suspected genetic disorders and also in forensics.

Dermal Ridges develop in relation to the fetal volar pads, the formation of these pads is first visible on the fingertips during 6th–7th week of embryonic development [4].Dermal ridges are influenced by blood vessel-nerve pairs at the border between the dermis and epidermis during prenatal development and factors such as inadequate oxygen supply, unusual distribution of sweat glands, and alterations of epithelial growths could influence the ridge patterns.The three major patterns of fingerprint include Arch, Loop, Whorl pattern and ‘atd, dat, adt’ palmar angles. Abnormalities in epidermal ridges are influenced by a combination of hereditary and environmental factors. Oral diseases also have various etiological factors like tobacco chewing, alcohol consumption, viral diseases, dietary and environmental factors, some oral diseases are also genetically determined especially the precancerous lesions, cancers, periodontal diseases, malocclusion and dental caries [5,6].

Oral submucous fibrosis, a precancerous lesion is a chronic disease that affects oral mucosa, as well as pharynx, and upper 2/3rd of the oesophagus. It occurs mainly due to areca nut chewing, and also genetics is an important predisposing factor[7]. Various studies show agreement of dermatoglyphic features in assessing various medical conditions. It serves as a useful tool in understanding basic question in biology, medicine and genetics and a tool to predict occurrences and risks for biomedical events. Investigations has been conducted on dermatoglyphics manifestation on chromosomal disorders like Down syndrome, Turner’s syndrome etc. indicators of breast cancer, tuberculosis, etc. Dermatoglyphics has been a boon to study occurrences of a lot of hereditary diseases and disorders. Variation from the healthy normal type of fingerprint occurs in many human disorders and diseased condition.

In the field of dentistry dermatoglyphics has been used to unveil various oral diseases like precancerous lesion, malocclusion, dental caries, cleft lip and palate etc[1].

The purpose of our study was to explore the association between various dermatoglyphic patterns and occurrence of Oral submucous fibrosis among cases and controls .

METHODS-

The study participants were examined in the Department of Public Health Dentistry, Peoples College of Dental Sciences and Research Centre and the observations were recorded in the pre designed proforma.

Study location: People's College of Dental Sciences & Research Centre, Bhopal (M.P)..

Duration of the study: The study was conducted from 1st July 2017 to 30th September 2017.

Sample size : Sample size calculation was based on review of literature and the formula. According to the estimated prevalence of Oral submucous fibrosis (OSMF) in India (6%), [8] and assuming a standard error of 10%, minimum sample size of 15 was calculated. The final sample size comprised of 30 OSMF patients and 30 healthy controls. The total sample size was 60.

Study variables :

Tobacco habits was recorded for all the participants. All the participants in the study were examined for intra oral findings. CPI score, Loss of Attachment score was recorded. A predesigned questionnaire (ANNEXURE I) including questions on history of tobacco consumption, duration of tobacco consumption, form of tobacco intake, frequency of using smoking and smokeless form of tobacco, frequency of brushing, aids used to clean teeth and how the patients rate their overall oral health. Dermatoglyphic patterns were also recorded for Arch, whorl and loop finger print pattern [Figure I], 'atd' angle, 'dat' angle, 'adt' angle [Figure II].

Inclusion criteria :

- Patients diagnosed with OSMF.
- Patients willing to participate.

Exclusion criteria :

- Patients with scars or any injury to digits.
- Patients having any disability of the upper limb
- Patients under any medication or having any systemic disease and contraindicated for oral examination.

Infection control :

The clinical examination was carried out using aseptic precautions. All the instruments were used once in a day and were autoclaved afterwards for the next time use. Disposable gloves and mouth mask were used for examination of all study participants.

Intervention :

A structured format was designed, for the collection of demographic data, detailed history of habits and medical history. [Annexure I] All the subjects had undergone clinical examination by a

single calibrated examiner for presence of OSMF lesion. Those having the lesions were allocated to the study group and those who did not have any signs and symptoms of OSMF were allocated to the control group. This was followed by recording finger and palmar printing for all the patients.

Recording finger and palm print:

Palmar prints were taken by using standard ink method proposed by Strong AM23, using blue duplicating ink (Kores India Limited, Mumbai), Thick bond paper (100 g/m²).

Apparatus and Materials:

Gloves, Mouth mask, Head cap, Kidney tray, Mouth mirror, Probe, CPITN probe, Tweezer, Cotton. Disinfectant, Koresindia ink pad, Thick white bond paper (100g/m²), Magnifying glass (6xs), divider, scale and compass.

Procedure:

The hands of the study participants were cleaned with soap and water and then scrubbed thoroughly with an antiseptic lotion and allowed to dry. This was done to enhance the quality of the dermatoglyphic prints, by removing sweat, oil or dirt from the skin surface. After this, right hand four digits were guided by the researcher to the ink stamp pad and pressed firmly against the bond paper (100 GSM). Then this was repeated for the thumb and palm of the same hand. The paper was stabilized on a hard smooth surface board. The same procedure was repeated for the left hand. The fingertip pattern configurations were categorized as arches, loops, whorls and palmar angles were categorized as 'atd, dat, adt'. The dermatoglyphic patterns were analyzed with the help of a magnifying glass (6 xs). The finger and palmar prints were analyzed qualitatively and quantitatively for arches, loops, whorls finger print pattern and 'atd, dat, adt' palmar angles using explainCummins, Midlo and Penrose method.[9, 10]

Statistical Analysis:

Data was analyzed using IBM SPSS (statistical package for the social sciences) for windows, version 22.0 Armonk, NY: IBM corp. for the generation of descriptive and inferential statistics. The statistically significant difference among groups was determined by the chi square test, students t test and the level of significance was set at $p < 0.05$.

RESULTS-

Table- 1 Frequency Distribution of Tobacco usage among OSMF group and Control group
When we compared the frequencies of tobacco usage between the cases of OSMF and controls significant difference was noted with respect to usage of tobacco, duration of tobacco use, form of tobacco intake, frequency of smokeless tobacco consumption and form of smokeless tobacco intake ($p < 0.05$).

Table-2 comparison of oral health behavior among OSMF group and control group

When we compared the frequencies of oral health behavior between the cases of OSMF and controls significant differences was noted for brushing frequency and rating of overall oral health ($p < 0.05$).

Table -3 Comparison of cpi and loa score among OSMF and control group .

When we compared the frequencies between the groups significant difference noted for presence of bleeding gums ($p < 0.050$)

Table-4 Comparison of Finger print patterns among OSMF group and Control group

When we compared the frequencies significant difference noted between the groups, there was significant increase in the whorl pattern among OSMF group (55%), whereas in control group loop pattern (66.6%) was found to be significantly increased ($p < 0.05$).

Table -5 Comparison of Palmar angles among OSMF group and Control group

When we compared the means significant difference noted between the groups for right hand and left hand palm 'dat' angle ($p < 0.05$). dat angles found to be increased in OSMF group.

DISCUSSION-

The present case control study was carried out to explore the association and to assess the risk by dermatoglyphic patterns among patients of Oral submucous fibrosis visiting the Outpatient Department (OPD) of People's College of Dental Sciences and Research Centre.

Tobacco usage was found more in OSMF group than control group. Brushing frequency and overall health rating was more in control group than in OSMF group. Presence of bleeding gums was noticed in OSMF group. This indicates the role of good oral hygiene in prevention of ORAL Submucous fibrosis. In the present study whorl type finger print pattern found to be highest in OSMF group. Increase in dat angle was noted in OSMF group.

Our study was in accordance with Shetty P et al [5] did study done on dermatoglyphics and found it as a genetic marker for oral submucous fibrosis reported that the percentage of whorls in study groups was 24% and 20% in the right and left hand respectively, as compared to 7% and 5% in controls group. The percentage of arches in study group was 0% and 1% in the right and left hand respectively as compared to 8% and 7% in control group.

Our study also was in accordance with Ganvir SM et al [2] who did study on dermatoglyphics to detect genetic predisposition in oral squamous cell carcinoma (OSCC) and oral submucous fibrosis reported that Whorls were the predominant fingerprint pattern in majority of OSCC (51%) and OSMF (53%) patients, whereas loops were the predominant fingerprint pattern in majority of control group individuals (group I-60% and group II-68%).

Our study was also in accordance with Kumar S et al[10] who did study on dermatoglyphics in oral submucous fibrosis patients reported marked decrease of tented arches, ulnar and radial loops, and an increase of simple whorls in OSMF subjects in comparison with normal individual. Study showed that Fingerprint pattern is genetically determined. Similarly, the tendency of development of OSMF in gutkha chewers is also genetically determined. In the present study similar findings reported there was significant increase in the whorl pattern among OSMF group 55%, whereas in control group loop pattern 66.6% was found to be significantly increased.

Our study was inconsistent with Gupta A et al[11] who Conducted a study on role of dermatoglyphics as an indicator of precancerous and cancerous lesions of the oral cavity. Significant findings in OSMF included an increase in frequency of arch and ulnar loop pattern, decrease in frequency of simple whorl patterns on fingertips in OSMF patients.

Our study is inconsistent with Tamgire DW Et Al [12] who conducted a study to analyze qualitative dermatoglyphic of fingertip patterns in patients of oral sub mucous fibrosis. A total of 200 subjects included in the study. Results obtained showed no significant difference in dat angles and highly significant differences in adt angles in patients with Oral submucous fibrosis.

Our study was inconsistent with Dutta N et al [13] who conducted a cross-sectional study to compare Finger Print Patterns in Patients with and without Oral Submucosis Fibrosis Results obtained showed decrease in arches pattern, radial loop pattern, whorl pattern and 'atd' angle in patients with OSMF.

CONCLUSION-

1. Tobacco usage was found more in OSMF group than control group.
2. Brushing frequency and overall health rating was more in control group than in OSMF group.
3. Presence of bleeding gums was noticed in OSMF group.
4. Presence of Whorl type of fingerprint pattern and Increase in dat angle found in our study would probably be served as a candidate screening marker for susceptibility to oral submucous fibrosis in general population.

Dermatoglyphic patterns can be utilized to study the genetic basis of various oral diseases like oral cancer, oral submucous fibrosis, dental caries, periodontitis, malocclusion etc. Dermatoglyphic patterns may represent the genetic makeup of an individual and therefore can be used as screening tool. Dermatoglyphics serves to strengthen the diagnostic impression of the disease and hence preventive oral health measures can be undertaken. The population at risk can be appropriately counseled and motivated to change the lifestyle and the frequency of developing dreaded diseases in later life may also be prevented.

Limitations of Study -

1. To establish an association with dermatoglyphic patterns and OSMF, observations should be made on a larger sample which is representative of the entire population.
2. The recording of fingerprints was also dependent on the pliable nature of application of fingerprint pressure and the amount of ink applied which could lead to improper fingerprints.
3. The amount of spreading of the fingers when the patterns are recorded can also affect the palmar angles.

REFERENCES-

- [1.] Babu GB, Asif SM: Dermatoglyphics in dentistry: A review, *Int J Contemp Dent Med Rev*, vol.2015.
- [2.] Ganvir SM, Gajbhiye NY: Detection of genetic predisposition in oral squamous cell carcinoma (OSCC) and oral submucous fibrosis patients by qualitative analysis of finger and palm-print patterns: A dermatoglyphic study, *Clin Cancer Investig J* 2014;3:377-82.
- [3.] Shetty SS et al: Dermatoglyphics: A prediction tool for dental caries, *International Journal of Dental Research*. 2016 Jul 31;4(2):30-2.
- [4.] Reddy H et al: dermatoglyphics and periodontal diseases-a possible relation for early prediction, *Int. J. Adv. Res.* 2017 Oct 5(10), 1332-1338.
- [5.] Shetty P et al: Dermatoglyphics as a genetic marker for oral submucous fibrosis: A cross-sectional study. *Journal of Indian Association of Public Health Dentistry*. 2016 Jan 1;14(1):41.
- [6.] Abhilash PR et al: Dermatoglyphics in patients with dental caries: A study on 1250 individuals. *J Contemp Dent Pract*. 2012 May 1;13(3):266-74.
- [7.] Penrose LS. Memorandum on dermatoglyphic nomenclature. *Birth Defects Orig Artic Ser*. 1969;6:72-84.
- [8.] Nigam NK et al: Prevalence of oral submucous fibrosis among habitual gutkha and areca nut chewers in Moradabad district, *Journal of Oral Biology and Craniofacial Research*. 2014 Apr 30;4(1):8-13.
- [9.] Penrose LS. Fingerprints and palmistry. *Lancet*. 1973;1:1239-42.
- [10.] Kumar S et al: A dermatoglyphic study in oral submucous fibrosis patients, *Journal of Indian Academy of Oral Medicine and Radiology*. 2014 Jul 1;26(3):269.
- [11.] Gupta A, Karjodkar FR. Role of dermatoglyphics as an indicator of precancerous and cancerous lesions of the oral cavity. *Contemporary clinical dentistry*. 2013 Oct;4(4):448.
- [12.] Tamgire Dw et al: Qualitative dermatoglyphic analysis of finger tip patterns in patients of oral submucous fibrosis. *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 2013 May-Jun 6 (5):24-27.
- [13.] Dutta N et al: Comparison of fingerprint patterns in patients with and without oral submucous fibrosis a dermatoglyphics study, *International Journal of Contemporary Medical Research* 2016;3(4):1172-1173.

TABLES:

Table-1 Frequency of Tobacco usage among OSMF group Control group

		OSMF group (N=30) N (%)	Control group (N=30) N (%)
Tobacco user	Yes	30 (100)	24 (80)
	No	0 (0)	6 (20)
Duration of tobacco use	0-3 years	6 (20)	4 (13.3)
	4-6 years	4 (13.3)	9 (30)
	7-10 years	7 (23.3)	9 (30)
	11-15 years	7 (23.3)	2 (6.7)
	>15 years	6 (20)	0 (0)
Frequency of smoking	Non smoker	20 (66.7)	16 (53.3)
	0-2/day	6 (20)	6 (20)
	3-5/day	2 (6.7)	4 (13.3)
	6-10/day	1 (3.3)	3 (10)
	11-15/day	1 (3.3)	0(0)
	>15/day	0 (0)	1 (3.3)
Form of tobacco intake	Chewing tobacco (smokeless)	21 (70)	9 (30)
	Smoking	0 (0)	8 (26.7)
	Both (smoked + smokeless)	9 (30)	6 (20)
	None	0 (0)	7 (23.3)
Frequency of smokeless	Not using	0 (0)	14 (46.7)
	1-5 pouch	16 (53.3)	16 (53.3)
	6-10 pouch	9 (30)	0 (0)

tobacco consumption	11-15 pouch	3 (10)	0 (0)
	>15 pouch	2 (6.7)	0 (0)
Form of smokeless tobacco intake			
Form of smokeless tobacco intake	Not taking any	0 (0)	14 (46.7)
	Plain pan masala	2 (6.7)	1 (3.3)
	Arecanut	18 (60)	14 (46.7)
	Tobacco	10 (33.3)	1 (3.3)

Table-2 Comparison of Oral health behavior among OSMF group and Control group

		OSMF group N (%)	Control group N (%)	Chi square value	p Value
Frequency of cleaning teeth	Once a day	23 (76.7)	10 (33.3)	15.010	0.001*
	Twice a day	7 (23.3)	11 (36.7)		
	2 or more times a day	0 (0)	9 (30)		
Aids used to clean teeth	Tooth brush	21 (70)	23 (76.7)	0.491	0.782
	Finger	6 (20)	4 (13.3)		
	Chewstick	3 (10)	3 (10)		
	Any other	0 (0)	0 (0)		
Use toothpaste	Yes	21 (70)	23 (76.7)	0.341	0.559
	No	9 (30)	7 (23.3)		
Rating of present oral health	Very poor	7 (23.3)	0 (0)	37.956	0.000*
	Poor	16 (53.3)	2 (6.7)		
	Neither good nor bad	7 (23.3)	8 (26.7)		
	Good	0 (0)	14 (46.7)		
	Very good	0 (0)	6 (20)		

Chi square value; $p < 0.05$

Table- 3 Comparison of CPI and LOA score among OSMF and Control group

		OSMF group N (%)	Control group N (%)	Chi square value	p Value
CPI score	Healthy	24 (80)	26 (86.6)	10.719	0.097
	Bleeding	29 (96.6)	20 (66.6)	12.124	0.016*
	Calculus	23 (76.6)	13 (43.3)	7.185	0.207

Chi square value; p<0.05

Table-4 Comparison of Finger print patterns among OSMF group and Control group

	OSMF group N (%)	Control group N (%)	Chi square value	p Value
Total Arch pattern	9 (3)	17 (5.6)	3.286	0.350
Total Loop pattern	126 (42)	200 (66.6)	30.378	0.001*
Total Whorl pattern	165 (55)	83 (27.66)	32.764	0.000*

Chi square value; p<0.05

Table-5 Comparison of Palmar angles among OSMF group and Control group

	OSMF group N (%)	Control group N (%)	p Value
	MEAN+/-SD	MEAN+/-SD	

Right hand palm atd angle	44.43+/-3.49	45.33+/-3.71	0.338
Right hand palm dat angle	58.56+/-5.19	53.26+/-4.22	0.000*
Right hand palm adt angle	80.03+/-6.34	81.20+/-4.96	0.431
Left hand palm atd angle	45.26+/-4.43	45.00+/-3.87	0.805
Left hand palm dat angle	58.83+/-4.08	51.85+/-5.56	0.000*
Left hand palm adt angle	80.16+/-6.15	81.46+/-4.36	0.349

Students t-test; p<0.05

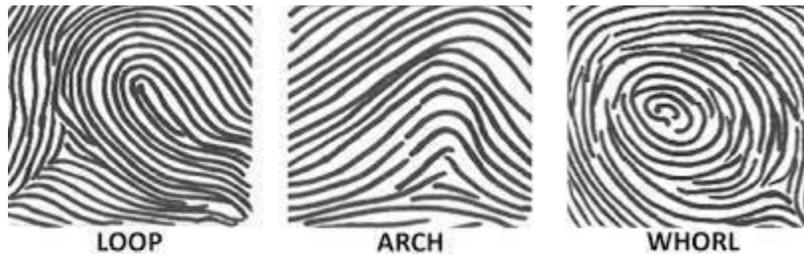


Figure- I Finger Print Patterns

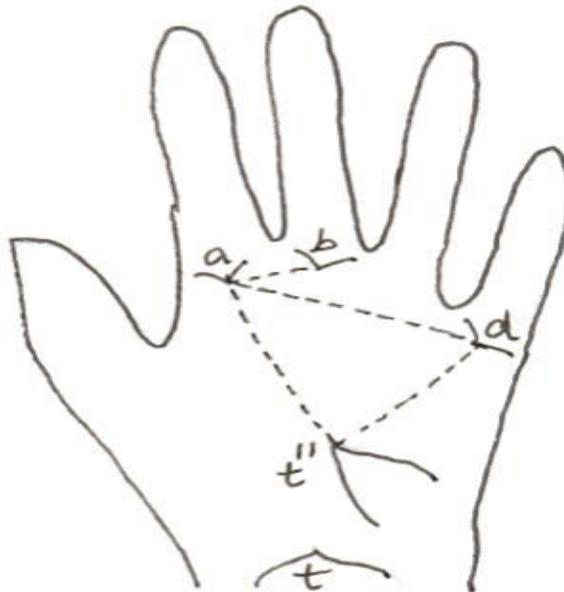


Figure-II Palmar 'atd, dat,adt' Angles

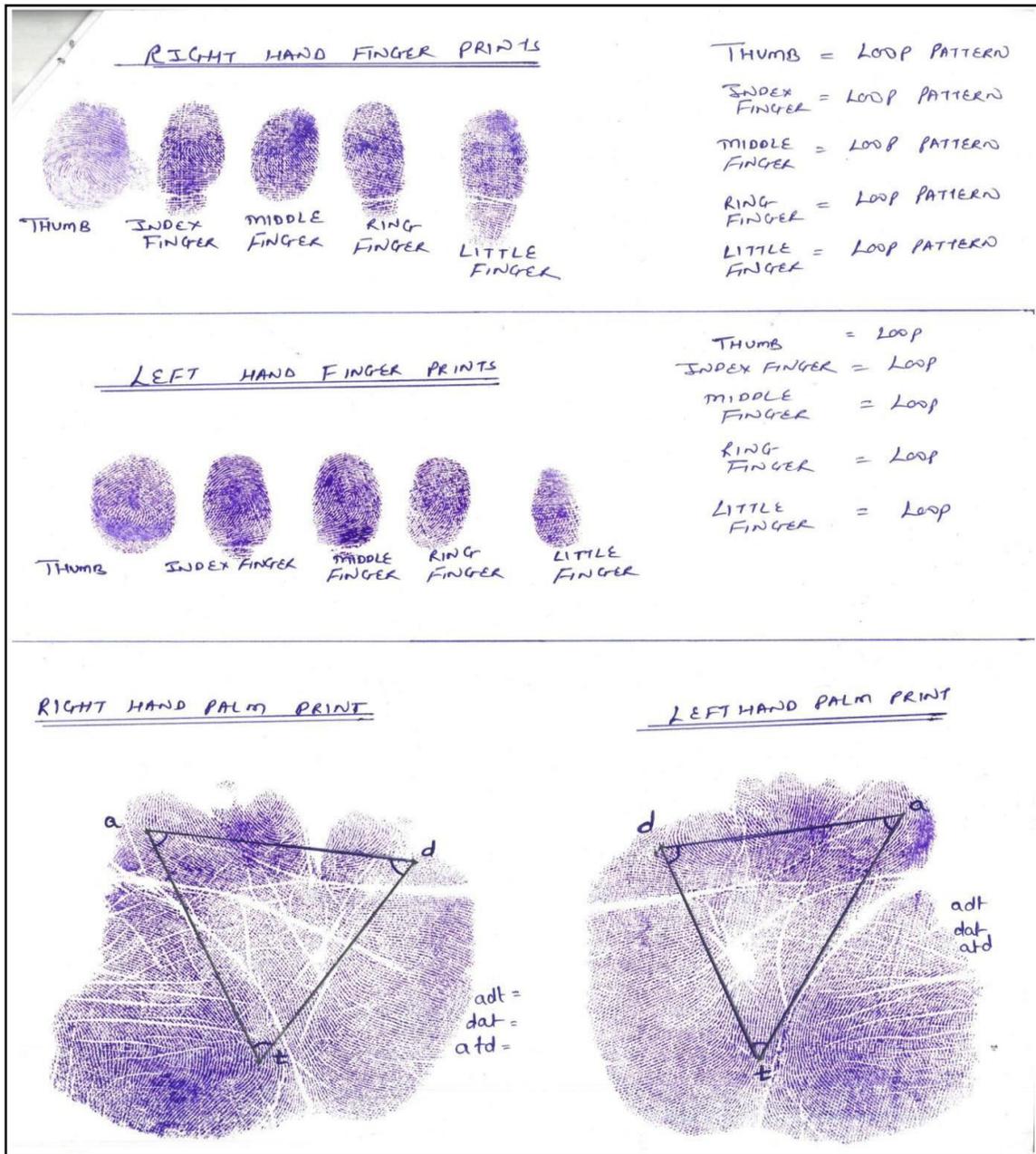


Figure-III Recorded Finger and palm print of study participants by inkpad method

People's College of Dental Sciences and Research Centre, Bhopal (M.P.)
Department Of Public Health Dentistry

Exploring the association between dermatoglyphic patterns and occurrence of Oral
submucous fibrosis

GENERAL INFORMATION:

S.No:

Date:

Name:

Age :.....

Gender :.....

Place:

A. How long have you been used tobacco?

- a. upto 3 years
- b. 4-6 years
- c. 7-10 years
- d. 11-15 years
- e. > 15 years

B. How frequently have you smoked?

- a. Upto 2 per day
- b. 3-5 per day
- c. 6-10 per day
- d. 11-15 per day
- e. > 15 per day

C. What is form of intake?

- a. Chewing tobacco.(smokeless tobacco)
- b. Smoking.
- c. Both

D. How many times in day you consume tobacco?

- a. 1-5 pouch.
- b. 6-10 pouch.
- c. 11-15 pouch.
- d. >15 pouch.

E. Which form of tobacco you take?

- a. Plain pan masala
- b. Arecanut.
- c. Tobacco
- d. Mawagutka
- e. Other.

ANNEXURE I