



COMPARATIVE STUDY TO EVALUATE PALMAR DERMATOGLYPHICS PATTERN IN OSCC, OSMF AND CONTROL GROUP

Oral Pathology

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ABSTRACT

Background: Dermatoglyphics is a relatively new science, which involves the study of fine patterned dermal ridges on digits, palms and soles. It is suggested that many genes, which take part in the control of finger and palmar dermatoglyphic development, can also give indication to the development of premalignancy and malignancy, hence identifying high- risk people for Oral cancer and precancer could be of great value to decrease the incidence of the same **Aim:** To evaluate the predominance of dermatoglyphics pattern in OSCC, OSMF and control group. **Design:** A total of 90 patients, 30 histopathologically diagnosed cases of Oral Submucous fibrosis, 30 oral squamous cell carcinoma patients and 30 patients in control group were included in the study. **Result:** Loops were the predominant pattern in all the study groups (OSMF, OSCC & Control). Whorl pattern is seen more in OSCC patients than control group.

KEYWORDS

Palmar dermatoglyphics, Oral squamous cell carcinoma, Oral Submucous fibrosis

INTRODUCTION:

Dermatoglyphics was derived from the Greek word “dermis” meaning skin and “glyph” meaning curving. Dermatoglyphics is the science of configuration of the epidermal ridges of the volar surfaces of the fingers, toes, palms and soles¹

The scientific basis of friction ridge identification has evolved over many years, even centuries. The scientific study of papillary ridges of the hands and feet is credited as the beginning with the work of **Joannes Evangelista Purkinje in 1823.**²

It is suggested that many genes, which take part in the control of finger and palmar dermatoglyphic development, can also give indication to the development of premalignancy and malignancy, hence identifying high- risk people for Oral cancer and precancer could be of great value to decrease the incidence of the same.³

Oral squamous cell carcinoma (OSCC) is the most frequent malignancy in the mouth, accounting to 95% of all oral malignant lesions. The most affected sites are the tongue, inferior lips and floor of the mouth. The typical demographic profile of OSCC is one of a man in the fifth to eighth decades of life, who is a tobacco chewer and/or a smoker. Less than 10% of cases arise in women. Oral squamous cell carcinoma has a great predisposition to produce metastasis in lymph nodes.⁴ Oral Submucous fibrosis (OSMF) is a potentially malignant condition and it affects approximately 0.5% (5 million) people of the population in the Indian subcontinent.³

Oral Submucous fibrosis is a chronic precancerous disease of oral mucosa characterized by inflammation and progressive accumulation of collagen fibres in lamina propria and deeper connective tissue followed by stiffening of oral mucosa resulting in difficulty in opening the mouth. The available epidemiological evidences suggest that chewing of Gutkha (Areca Nut) is an important risk factor for Oral Submucous Fibrosis, but not all the chewers develop this condition. Genetic predisposition explains such individual variability. If dermatoglyphic marker of Oral Submucous Fibrosis is found, it will be of immense clinical importance in this era of Gutkha chewing, so that the people developing OSMF may be forecasted amongst the Gutkha chewers.⁵

Various epidemiological studies support the fact that genetic alterations may be involved in the pathogenesis of OSCC and OSMF. These antenatal disturbances can alter the epithelium to make it susceptible to various carcinogens.⁵ So, the present study was conducted to evaluate the palmar dermatoglyphics pattern in Oral

Squamous cell carcinoma (OSCC) and Oral submucous fibrosis (OSMF) patients and to compare the patterns of these disease with the control group.⁶

MATERIAL & METHOD:

A total of 90 patients, 30 histopathologically diagnosed cases of Oral Submucous fibrosis, 30 oral squamous cell carcinoma patients and 30 patients in control group were included in the study

Group I (OSMF group):-

included histopathologically diagnosed cases of Oral Submucous Fibrosis with habits of tobacco chewing & smoking. Out of 30 OSMF Cases, 26 were men & 4 were women.

Group II (OSCC):-

included histopathologically diagnosed cases of Oral Squamous Cell Carcinoma with habits of tobacco chewing & smoking. Out of 30 OSCC Cases, 27 were men & 3 were women.

Group III (Control group):-

included only non-smokers with no history of areca quid chewing. Out of the 30 control subjects, 20 were men and 10 were women.

Exclusion criteria:

Control group:

Healthy Individuals with habits of tobacco smoking and chewing or conditions were not considered.

Study group:

Lesions other than OSMF or OSCC and even combination of these disease were not included.

Method for data collection:

After explaining about the study to the subjects, an informed consent was obtained. A detailed history with thorough clinical examination was done and findings were recorded in a specially prepared case history proforma.

The clinically diagnosed cases of Oral submucous fibrosis and OSCC were confirmed histopathologically and then included in the study.

Materials used for obtaining palm and finger prints:

Ink pad (Blue – Ashoka company), A4 Size paper. (Century), Soap, Water, Towel, Magnifying lens, Ruler, Protractor, Pencil, Sharp/ pointed instrument

RESULT:

he statistical analysis used in the study was Unpaired "T" test and One-Way ANOVA test of significance. In this test the p values of less than 0.05 was not achieved which shows insignificant statistical values.

In the present study, among finger ridge pattern loop pattern is predominant among control group (86.7%), OSMF (76.7%) and OSCC (63.3%) which does not have statistical significance. Whorl pattern is seen more in OSCC (33.30%) patients than control group (13.30%).

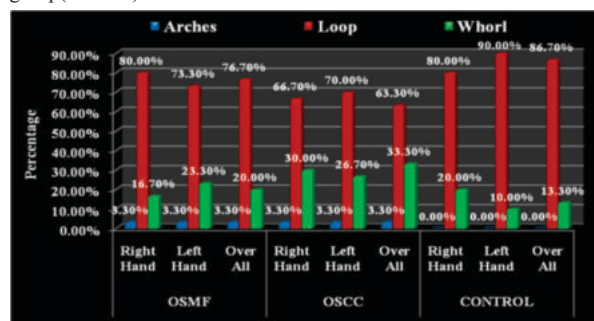


Figure : Bar diagram showing average Distribution of Finger Ridge Pattern in Right and Left Hand of OSMF, OSCC and Control Group

DISCUSSION:

Dermatoglyphics is the study of palmer and plantar dermal ridge carvings on hands and feet (Derma: Skin, Glyph: Carving). The terminology was coined by Cummins and Midlo in 1926 and Cummins is regarded as the "Father of Dermatoglyphics." In ancient India, ridge pattern study was known as "Samudra Shastra." The epidermal ridge patterns were classified into "Chakra, Shankya and Padma" which corresponds with the whorl, loop, and Arch system of modern classification. Fingerprints are unique to all individuals and remain unchanged over the lifetime. Multiple genes determine the fingerprint configuration and the study of fingerprints reveal vital genetic and medical information about an individual.⁷

Galton's fingerprint system included the three major patterns of fingerprint types:

- I) Arch: Arches have no triradii. Tri-radius is formed by the confluence of three ridge systems that form angles of approximately 120° with one another. Arch pattern is further classified into plain and tented arch.
- II) Loop: Loops have one triradius, and is further classified into Ulnar and Radial loop.
- III) Whorl: whorls have two triradii. The 'whorl' is characterised by a pattern of concentric circles, or a spiral shape - some of the ridges make a turn through at least. This pattern is further classified into plain whorl; Central pocket loop; Double loop and Accidental whorl.⁸

The development of dermatoglyphic patterns begins with the appearance of fetal pads in the 6th week of gestation and ends with the appearance of finished patterns on the surface of the skin in the 24th week of gestation. From this stage onwards, they are unaffected by the environment, and this explains their unique role, as an ideal marker for individual identification and the study of populations, as well as detection of defects due to intra-uterine irregularities in the early weeks of pregnancy.⁹

It is suggested that many genes, which take part in the control of finger and palmar dermatoglyphic development, can also give indication to the development of premalignancy and malignancy, hence identifying high-risk people for Oral cancer and precancer could be of great value to decrease the incidence of the same.³

Oral cancer (OC) is considered a serious public health problem that causes great morbidity and mortality in the population. While OC has a lower incidence than other malignant tumors, it is known to produce high mortality and serious disturbances or discomfort in the patient as a consequence of either the tumor itself or of the treatment. The Oral Squamous Cell Carcinoma is the most common malignant tumor of the lip, oral cavity and oropharynx (90% of the cases) while the remaining 10% of the cases are mainly melanomas, sarcomas, minor salivary gland carcinomas and metastatic cancers.¹⁰ "Potentially malignant disorders," conveys that not all lesions and conditions may transform

to cancer, some may have an increased potential for malignant transformation. These disorders of the oral mucosa are also indicators of risk of likely future malignancies elsewhere in the oral mucosa and not only site specific predictors.¹¹

Oral submucous fibrosis (OSMF) is a disease due to a chronic, insidious change in fibro-elasticity, characterized by burning sensation in the oral cavity, blanching, and stiffening of the oral mucosa and oropharynx leading to trismus and inability to open the mouth.¹²

Various epidemiological studies support the fact that genetic alterations may be involved in the pathogenesis of OSCC and OSMF. These antenatal disturbances can alter the epithelium to make it susceptible to various carcinogens.⁵

Henceforth, present study has been aimed to compare & evaluate Palmar dermatoglyphics in OSCC & OSMF patients. In the present study 90 cases were evaluated & these 90 cases were grouped into study group & control group. Study group (Group I) consist of 30 histopathologically diagnosed cases of Oral Submucous Fibrosis (OSMF) with habits of tobacco chewing & smoking; (Group II) consists of 30 histopathologically diagnosed cases of Oral Squamous cell carcinoma with habits of tobacco chewing & smoking. The control group (Group III) included 30 healthy individuals with no habit of tobacco chewing & smoking. The study design included evaluation of palmar dermatoglyphics by recording finger & palm prints by using ink pad & paper. This study was undertaken to evaluate quantitative & qualitative analysis of palmar dermatoglyphics in OSCC & OSMF and to determine whether specific correlation exists between dermatoglyphics with occurrence of OSCC & OSMF.

In current study, we used Ink method in that ink is applied on the area to be recorded and then prints are recorded on the smooth paper which gives fair results. This method is used in adults and cooperative children, law enforcement agencies also uses this method for identification purpose. The aim of using this method in our current study is as it is economical and less arduous is needed which is easy to carry to far away places or rural areas to include rural population in these studies.¹³

In the present study, among finger ridge pattern loop pattern is predominant among control group (86.7%), OSMF (76.7%) and OSCC (63.3%) which does not have statistical significance & that is in accordance with **Uduak Uman (2013)¹⁴; Tamgire DW (2013)⁵; Veena Kulkarni (2014)¹⁵; Lakshanika (2016)¹⁶; Punith Shetty (2016)¹⁷;**

Tamgire DW et al (2013), in their study found the predominating pattern is loop (59.2%) in control group without OSMF & (59%) in study group with OSMF.⁵

Veena Kulkarni (2014), found that loops were the predominant pattern among study group (OSMF) & control group. Significant findings in qualitative analysis of OSMF patients include increase in frequency of arches, decrease in frequency of simple whorls.¹⁵

Lakshanika & Nalini Aswath (2016) found that loops were predominant in group I i.e. tobacco users with leukoplakia (58.67%) & group II i.e. tobacco users with no lesions (49.7%).¹⁶

In the present study whorl pattern is seen more in OSCC patients than control group these findings are in accordance with the study of **Sindhu M Ganvir (2014)³**, who found 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.⁶

Uduak Uman et al (2013) who concluded that loops were the predominant pattern among cancer group as well as control group which is not of significant value. Hence, there was no association between the fingerprint & cancer.¹⁴

Punith Shetty et al (2016) found that among the three estimated patterns, the number of loops showed only slight variation between two groups. The percentage of loops was 30% in right & 38% in the left hand of subjects with OSMF respectively.

The same was 33% & 27% in right & left hands of the controls. It was

seen that the difference in the loop pattern in OSMF & control group was not significant in both the right & left Hand.¹⁷

In previous studies, **Elluru Venkatesh et al (2008)**, in their study found that loop pattern is predominant in patients with Leukoplakia (63%) & OSCC (60.70%) whereas whorl pattern is predominant in control group (68%).¹⁸

Ambika Gupta (2013) found in OSCC, there was an increase in frequency of arch and ulnar loop patterns on fingertips, decrease in frequency of simple whorl patterns on fingertips. Significant findings in OSMF included an increase in frequency of arch and ulnar loop pattern, decrease in frequency of simple whorl patterns on fingertips. The results revealed that the field of dermatoglyphics holds promising results for determining the genetic susceptibility of individuals to develop SCC and OSMF. Various epidemiological studies support the fact that genetic alterations may be involved in the pathogenesis of OSCC and OSMF. These antenatal disturbances can alter the epithelium to make it susceptible to various carcinogens. These antenatal disturbances if responsible for a disorder, should manifest in a prenatal event such as dermal ridge formation.⁶

Deepa Jatti et al (2014), in their study found that in patients with OL, OSMF and OSCC (study group A) there was an increased frequency (60.7%) of arches, whereas in control groups B & C, there was an increased frequency of loops & whorls (36.1% & 40.5% resp).¹⁹

Satish Kumar et al (2014), in their study found there was a marked decrease of tented arches, ulnar & radial loops and an increase of simple whorls in OSMF subjects in comparison with normal individuals.²⁰

Hence, we can say that though Dermatoglyphics is a new & advanced science which shows genetic co-relation with various diseases and can be helpful in early detection of those diseases, but it is not useful in each & every disease. Based on findings of our study we can say that dermatoglyphics in OSCC & OSMF patients does not show any correlation.

CONCLUSION:

Dermatoglyphics which were used earlier in forensic science for human identification has new scope for early detection of various dental and medical diseases, which needs early detection to prevent disease progression, but this co-relation does not exist for all the diseases. So, it needs further studies with larger sample size within the same racial population, to prove if any co-relation exists between dermatoglyphics & OSMF & OSCC.

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