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Comparison of mean total ridge count and mean ATD angle in OSMF and oral Leukoplakia patients

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Abstract---Introduction: Palm prints formed once does not change throughout life and is not influenced by environment. Palmar Dermatoglyphics can indicate the development of potentially malignant and malignant lesions and help in identifying persons at high risk of developing Oral submucous fibrosis (OSMF) and Oral squamous cell carcinoma (OSSC). Materials and Methods: Dermatoglyphic patterns were collected from randomly selected 120 patients using 3M™ CSD200i. Single-digit Optical Scanner (3M™, Canada, 2015) with automatic capture mechanism was applied to capture finger prints of all the 10 fingers of patients, who were divided in control and test group with respective subgroups of leukoplakia and OSMF. Mean total ridge count and ATD angle were measured in

all patients and comparison was done between control group and patients with OSMF and leukoplakia. Results: The collected data was subjected to analysis using Chi-square test for comparison between the groups. The mean ATD angle in patients with osmf is 43.38, leukoplakia is 43.53, patients without lesion but with habit is 44.78, and patients without habit is 45.65.

Keywords---ATD angle, Dermatoglyphic, total finger ridge count.

Introduction

Dermatoglyphics is defined as the study of the epidermal ridges and their configurations on the fingers, palms and soles. The term dermatoglyphics was coined by Cummins and Midlo in 1926 which was derived from the Greek word derma meaning skin and glyphics meaning carvings.¹ The formation of the dermatoglyphics pattern occurs between 7th and 21st week of intrauterine life and gets fully completed by 7th month of intrauterine development. Finger ridge counts and frequencies of all palm patterns follow the genetic modes of major genes and it would never be influenced by environment or age factors. It does not change throughout the life of individuals except in events such as bruises and cuts of the fingertips.² These finger and palmar prints are permanent variables and inherited, differ amongst parents and their children, siblings and even in monozygotic twins. Because of these characteristics it has been used in forensic department for the identification of the individuals, and in the study of several genetic abnormalities. The first study on genetic abnormalities with dermatoglyphics pattern were done by Harold Cummins in Down's syndrome patient.³ Oral leukoplakia is considered as one of the most common premalignant lesion occurring in the oral cavity with increased risk of malignant transformation ranging from 0.6% to 20%. Oral leukoplakia (OL) is defined as a white plaque of questionable risk having excluded (other) known diseases or disorders that carry no increased risk for cancer.⁴ Oral submucous fibrosis (OSF) on the other hand is a premalignant condition associated mainly with tobacco chewing characterized by abnormal collagen deposition, ulceration, xerostomia, burning sensation and restricted mouth opening. It predominantly affects South East Asian population. The risk of malignant transformation is 1.5% to 15%.⁵ Though various epidemiologic studies suggest that the use of tobacco (chewing or non-chewing) is an important risk factor for the development of malignant and potentially malignant disorder of the oral cavity, not all individuals develop the same. It seems genetic predisposition could be an underlying mechanism. It increases the susceptibility of malignancy with disordered function of the genes controlling the fate of chromosomally damaged cells and the cell cycle tumor suppressor genes and genes involved in cell signaling (proto-oncogenes and oncogenes). Hence the assessment of genetic abnormalities also plays an essential role with the diagnostic procedure of PMD (Potentially malignant disorder) and OSCC. It can be determined by various genetic studies. As such these procedures are complex and expensive, hence dermatoglyphics can be efficiently employed with other clinical signs as a screening procedure as a noninvasive, simple, and inexpensive procedure for the assessment of genetic susceptibility. [6]

Material and Method

The present study was conducted in the Department of Oral Medicine and Radiology, Maharana Pratap College of Dentistry and Research Centre Gwalior. The study was performed to evaluate the finger-tip patterns among patients with leukoplakia and oral submucous fibrosis and comparison of fingertip patterns among individuals with adverse oral habits, without oral lesions and individuals without adverse oral habits, without oral lesions were made. Based on this, a sample size of 30 in each group was decided. The subjects were selected randomly from those who visited the outpatient Department of Oral Medicine and Radiology, and divided into control and study groups.

CONTROL GROUP (Group 1): Group 1A: 30 patients without any adverse oral habits and without oral lesions. Group 1B: 30 patients with adverse oral habit of chewing mixture of pan masala and tobacco with no lesion.

STUDY GROUP (Group 2): Group 2A: 30 patients with adverse oral habit of chewing mixture of pan masala and tobacco and having OSMF. Group 2B: 30 patients with adverse oral habit of chewing mixture of pan masala and tobacco and having Leukoplakia.

Inclusion criteria: Patients without any adverse oral habits..Patients with adverse oral habit of chewing mixture of pan masala and tobacco with no lesion. Patients with adverse oral habit of chewing mixture of pan masala and tobacco and having OSMF. Patients with adverse oral habit of chewing mixture of pan masala and tobacco and having Leukoplakia

Exclusion criteria: Patients undergoing treatment for OSMF and Leukoplakia. Patients having habits other than chewing mixture of pan masala and tobacco. Patients with other mucosal lesions like oral malignancy, lichen planus, candidiasis etc. Patients suspected of having any syndrome or abnormalities. Patients giving history of systemic diseases like diabetes, hypertension, heart diseases, bronchial asthma, epilepsy, anemia etc.

The objects were explained about the study and then included with an informed consent. The study was approved from the ethical committee of the institution. A detailed case history with thorough clinical examination had been done, and findings were recorded in a case history proforma. The cases of premalignant lesions and conditions (Leukoplakia and OSMF) were diagnosed on the basis of their clinical features and their association with supporting etiological factors.

Dermatoglyphic patterns were collected using 3M™ CSD200i Single-digit Optical Scanner, manufactured in Canada, 2015, works with automatic capture mechanism was applied to capture finger prints of all the 10 fingers of the subjects.

To enhance the quality of dermatoglyphic prints, it is necessary to remove sweat, oil and dirt from the skin. This was accomplished by washing the ridged areas with soap and water followed by drying and finger tips are placed gently on the sensor after the successful initialization of the scanner. A green light is projected from the sensor on which ridged surface finger is gently placed until the light disappears and shows the obtained image of dermatoglyphic pattern on the computer's screen on which the software is installed.

Once the satisfactory prints were obtained of the fingers the observations are as follows: Triradus which is the meeting point of three ridges that form angles of approximately 120 degree with one another could be absent or one or two in a finger. Triradus will be 0 for arch pattern, since it is present at the centre and the arch count is made from the triradus. Finger ridge count is done, by counting the number of ridges from the core to triradius. There can be two triradii occasionally present in a finger. The one with the highest ridge count is counted for finger ridge count. Total finger ridge count is done by taking the sum of finger ridge count of all 10 fingers in a subject.

Finger ridge count: was calculated in all 10 fingers in every subject. The count was done by counting ridges between the triradus and the core. Finger ridge count could be 0 in cases where triradius is absent. Total finger ridge count: was calculated for all 10 fingers and derived by adding the ridge counts on all ten fingers. Only the larger count was used on those digits with more than one ridge count. The mean was taken of total finger ridge count separately for all groups and comparison was made between them. (Fig.1)

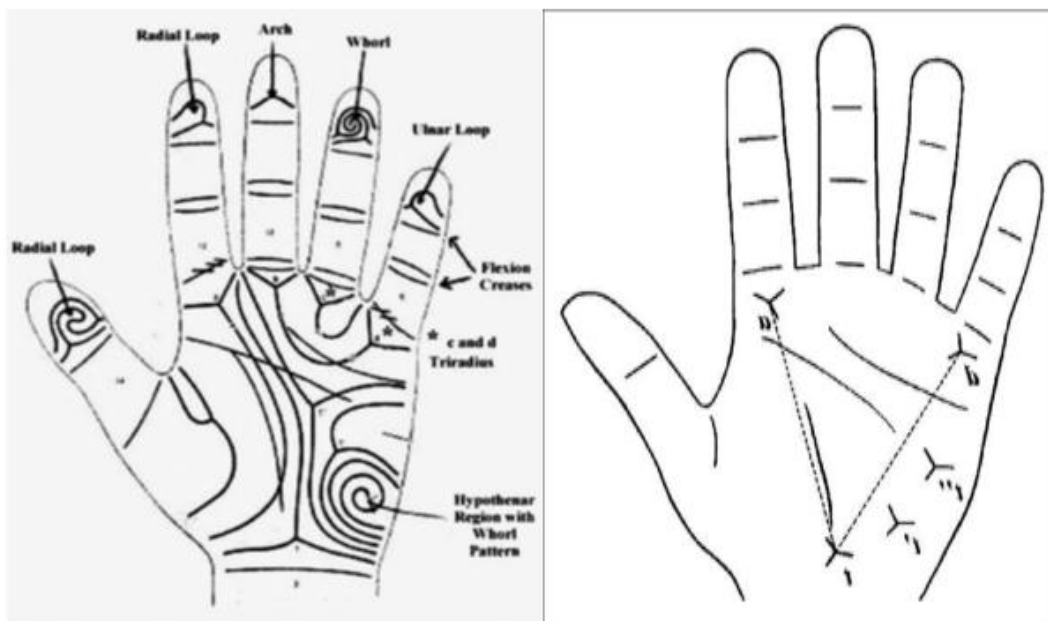


Figure 1: Dermatoglyphic Pattern and ATD angle

Table 1
Groups and patients

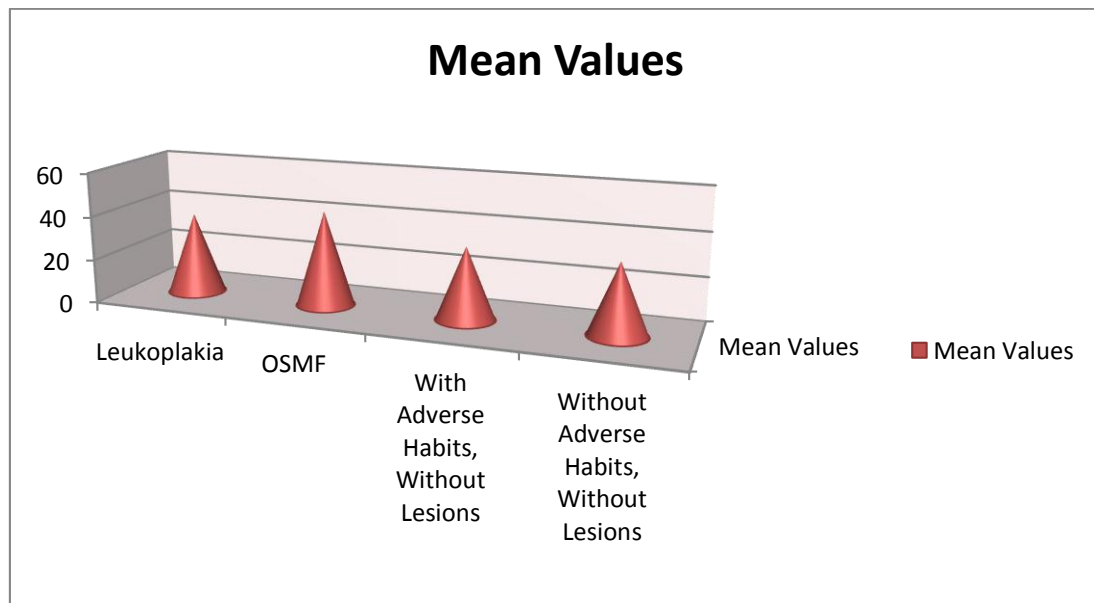
S.No.	Groups	Patients
1.	Leukoplakia (2B)	30
2.	Osmf (2A)	30
3.	With adverse oral habits, without oral lesions. (1B)	30
4.	Without adverse oral habits, without oral lesions (1A)	30

Patients are divided in four groups consists of 30 patients each. Group 1A and 1B are control groups and Group 2A and 2B are having patients with lesions. Qualitative analysis of dermatoglyphic pattern was done. Total ridge count and ATD angles were measured.

Table 2
Student-t test for comparison of total finger ridge counts between all the groups

S.No.	GROUPS	Mean \pm SD	P-Value
1.	Leukoplakia (2B)	37.14 \pm 32.75	P=0.52
2.	Osmf (2A)	43.30 \pm 30.24	P=0.12
3.	With adverse oral habits, without oral lesions. (1B)	32.90 \pm 28.41	P=0.93
4	Without adverse oral habits, without oral lesions (1A)	32.30 \pm 24.74	P=1

P value <0.005 is significant, above values are not significant

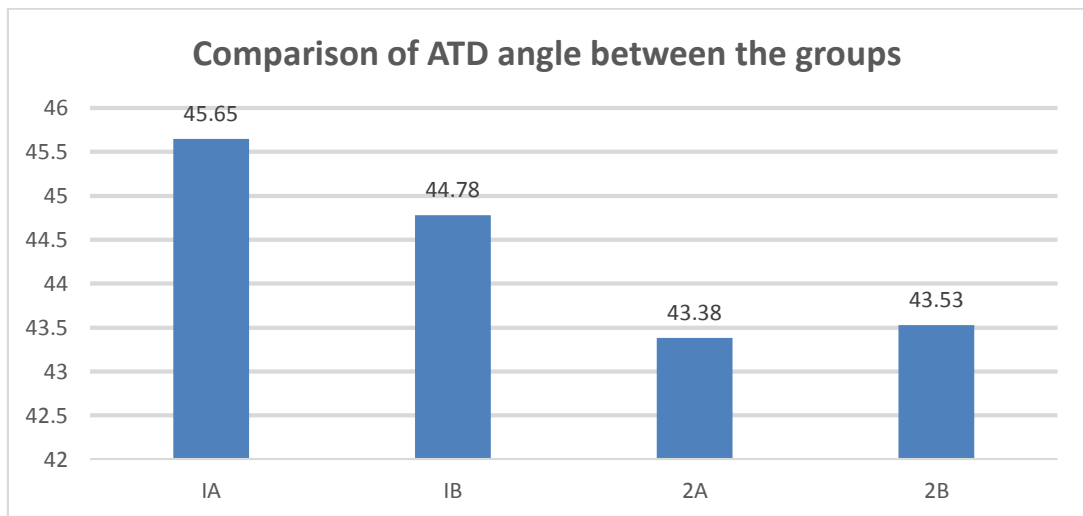


Graph 1: Comparison of total finger ridge counts between all the groups

On comparison of dermatoglyphic pattern of total finger ridge count between subjects in the groups: leukoplakia, osmf, with adverse oral habits, without oral lesions and without adverse oral habits, without oral lesions, no significant difference in P-Value was observed. Total finger ridge count is more in Patients with OSMF and Leukoplakia than patients without lesions. Patients with OSMF has less total ridge count than patients with leukoplakia. But these differences are statistically non-significant. (Table 2 and graph1)

Table 3
Comparison of ATD angle between the groups (using one-way ANOVA)

Groups	Mean	SD	P value
Leukoplakia (2B)	43.53	4.32	0.41
Osmf (2A)	43.38	3.45	
With adverse oral habits, without oral lesions. (1B)	44.78	5.62	
Without adverse oral habits, without oral lesions (1A)	45.65	4.56	



Graph 2: Comparison of atd angle between the groups

The mean ATD angle in patients with osmf is 43.38, leukoplakia is 43.53, patients without lesion but with habit is 44.78, and patients without habit is 45.65. The ATD angle is more in control group than in patients with osmf and leukoplakia. But this difference is statistically non-significant. (Table 3 Graph 2)

Discussion

The dermatoglyphic analysis is now beginning to prove itself as an extremely useful window for diagnosing conditions with a suspected genetic basis. Sir Francis Galton (1892) with his extensive research demonstrated the hereditary significance of fingerprints and biological variations of different racial groups. [7] Cumins and Midlo coined the term dermatoglyphics [8].

This study intends to establish dermatoglyphics as an advancing tool for a prediagnosis in premalignant lesions in patients with adverse oral habits who are susceptible for developing oral lesions associated with known etiology. Not all individuals with adverse oral habits develop premalignant lesions, but occurrence of premalignant lesions are genetically determined. The dermatoglyphic analysis

proves itself as a useful window for diagnosis. The present study was conducted to predict occurrence of these diseases, i.e., OSMF and leukoplakia and to initiate preventive measures in these high-risk group subjects. The inference was drawn from the present study is that the loop pattern is commonly found in all the groups but there was a mild rise in the frequency of occurrence of loops in pathologic conditions, i.e., OSMF and leukoplakia.

In present study, The ATD angle is more in control group than in patients with OSMF and leukoplakia which is in accordance with study done by Vijayaraghavan A et al who also reported decrease in ATD in angle in OSMF and Oral cancer patients than control group. [10] Patil PB et al reported mean ATD angle less in PMD patients than in control group but ATD angle is least in oral cancer patients. [11].

In present study, total ridge count is non significantly more in patients with OSMF and leukoplakia compared to control patients which was in contrast with study done by Vijayaraghavan A et al who reported mean AB ridge count slightly more in OSMF and Oral cancer patients than in control group.[10] In study done by Gupta A, they found that total frequency of ridge count was lower in OSMF patients than in patients with OSCC and control patients. [12] Jatti D et al reported that the study group- OSMF and oral cancer demonstrated an increase in the mean total finger ridge count as compared to the controls. [13]

Conclusion

The present study showed non-significant increase in Total ridge count and non-significant decrease in ATD angle patients with OSMF & leukoplakia compared with control group. More controlled prospective trials are needed to affirm the association, if any, at larger homogeneous Indian sample in future to validate the finding.

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