Palmar dermatoglyphics among gutkha chewers with and without oral submucous fibrosis

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Abstract

Background: Palmar dermatoglyphics has been and is being studied in many diseases and alterations in normal patterns have been noted. It has been an accepted fact that genetics plays an important role in determination of palmar dermatoglyphic patterns. Millions of people chew gutkha, but all of them do not suffer from oral submucous fibrosis (o.s.m.f.) It seems likely that a genetic predisposition could be an underlying mechanism.

Objectives: the present study aims to analyse various dermatoglyphic parameters in osmf and find a relation if any.

Materials and methods: the study was conducted in the dept. of anatomy, J N. Medical college, belgaum. The study included 150 individuals .

Results: significant findings in qualitative analyses of osmf patients include increase in frequency of arches, decrease in frequency of simple whorls, increase in pattern frequency in thenar/i_1 area in both hands. Significant findings in quantitative analysis of osmf patients include decrease in atd angle in both right and left hands.

Conclusion: the above mentioned parameters may be considered as genetic markers for oral sub mucous fibrosis. With the help of these parameters a gutkha chewer who is at risk for developing osmf can be diagnosed .

Keywords: dermatoglyphics, guthka chewer, oral submucous fibrosis.

Introduction

Oral Sub Mucous Fibrosis (OSMF) is a pre-cancerous condition characterized by accumulation of collagen in the lamina propria of oral mucosa[1]. This disease affects approximately 0.5% (5 million) people of the population in the Indian subcontinent. Although, chewing of Gutkha is an important risk factor for OSMF, not all chewers develop the disease. Genetic predisposition might explain such an individual variability.

Dermatoglyphics, coined by Cummins and Midlo in 1926, is a branch of genetics dealing with the skin ridge system[2]. The current state of medical dermatoglyphics is such that the diagnosis of some illness like Diabetes Mellitus, Schizophrenia, Hypertension and Epilepsy can now be aided by dermatoglyphic analysis.

Dermatoglyphics offer atleast two major advantages as an aid to the diagnosis of medical disorders: a) The epidermal ridge patterns on hands and soles are fully developed after birth and there after remain unchanged for life. b) Scanning of ridge patterns or recording their permanent impressions can be accomplished rapidly, inexpensively and without any trauma to the patient[2]. If a dermatoglyphic marker of OSMF can be found, it will be of immense clinical significance, because it can forecast the development of OSMF among Gutkha chewers. Thus, the present cross-sectional study aims to determine various dermatoglyphic features, among gutkha chewers without OSMF and compare them with the patients developing OSMF. By this, we can establish the importance of dermatoglyphics as an useful screening procedure among gutkha chewers.

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Materials and Methods

The material for the study consisted of finger and palm prints of patients selected from those attending out patient departments of the following institutions.Dept. of E.N.T. – Civil Hospital, Belgaum . Dept. of E.N.T. – K. L. E.'S Hospital and M.R.C., Belgaum and Dept. of Oral Medicine and Diagnosis - K. L. E.'S Dental Hospital, Belgaum .The finger and palm prints of normal individuals of comparable age group and sex with history of Gutkha chewing and normal individuals without history of gutkha chewing were taken for the study with informed consent.

Sampling Size: Study consisted of 150 randomly selected subjects categorized into 3 groups. 50 patients with OSMF ,50 gutkha chewing subjects without OSMF and 50 normal subjects without gutkha chewing habit.

Inclusion Criteria: Patients of OSMF with history of gutkha chewing are included. The lesions are described as thick fibrous bands. The normal gutkha chewing individuals and non gutkha chewing individuals of same age group and sex were also included.

Exclusion Criteria: Other causes for oral lesions like cavities, sharp tooth irritation, dentures, alcohol, smoking, aphthous ulcers etc. Patients with no history of gutkha chewing were excluded from the study.

Data Collection: Patients were informed about the procedure in detail and oral consent was obtained to conduct the study. Among the various number of methods used for recording dermatoglyphics, the most routinely used one i.e. the ink method was used for this study. The materials used are simple. They include, black duplicating ink (Kores, Bombay), Printing card, roller, inking slab, pressure pad, kerosene, alcohol, soap (Cleaning agents) and simple magnifying lens. Subjects were asked to wash their hands with soap water, so as to remove any oil or dirt. Ink was smeared on their hands using a roller. Ink slab and surface to be printed were prepared. First prints of fingertips were taken followed by that of palm, on the paper kept over the table (Figure1). Using an official proforma essential information was recorded. The data included age, sex, address, history of gutkha chewing and other medical history of importance. The finger and palm prints were analysed qualitatively and quantitatively. The qualitative analysis done include finger print patterns and palmar patterns. The quantitative analysis done include, total finger ridge count and atd angles.

Qualitative Analysis: To analyse finger pattern frequency, the finger tip pattern configurations were classified as arches (A), Loops (L) and whorls (W). Loops were recorded as ulnar or radial depending on the side on which it opened and whorls were recorded as true and composite (W^{comp}) whorls. To study palmar pattern configurations parameters chosen were patterns in Thenar / I_1, I_2, I_3 and I_4 interdigital areas and hypothenar area (Figure 2). Accessory triradii when present, were recorded.

Quantitative Analysis: The characteristics of dermatoglyphics can be described quantitatively i.e. by counting the number of ridges within a pattern and measuring angles or distance between specified points of triradii[3]. The counting was done along a straight line connecting the triradii point to the point of core (Figure 3). Symbols and ridge counts were recorded in order, beginning from first digit of right hand to the fifth digit and from first digit of left hand to fifth digit of same hand. The total finger ridge count[TFRC] was 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. In a loop there is one triradius and so one ridge count; in a whorl with 2 triradii there are two counts and higher is used. For an arch the score is zero. The atd angle was recorded by drawing lines from the digital triradius 'a' to the axial triradius 't' and from this to the digital triradius 'd'(Figure 4). In palms with more than one axial triradius, the atd angle originating from each axial triradius was measured.

Statistical Analysis: For quantitative analysis the arithmetic mean, standard deviation and critical value were calculated. C. R. = $X_1 - X_2$ / S.E. $(X_1 – X_2)$ X_1 and X_2 are means of two groups and S.E. $(X_1 – X_2)$ is the standard error of the difference between X_1 and X_2 which is given by the formula, S.E. $(X_1–X_2) = \underline{v}\ (SD_1^2/ n_1) + (SD_2^2 / n_2)$ Where, SD_1 and SD_2 are standard deviations and n_1 and n_2 are sample size. For qualitative analysis chi square test was applied.

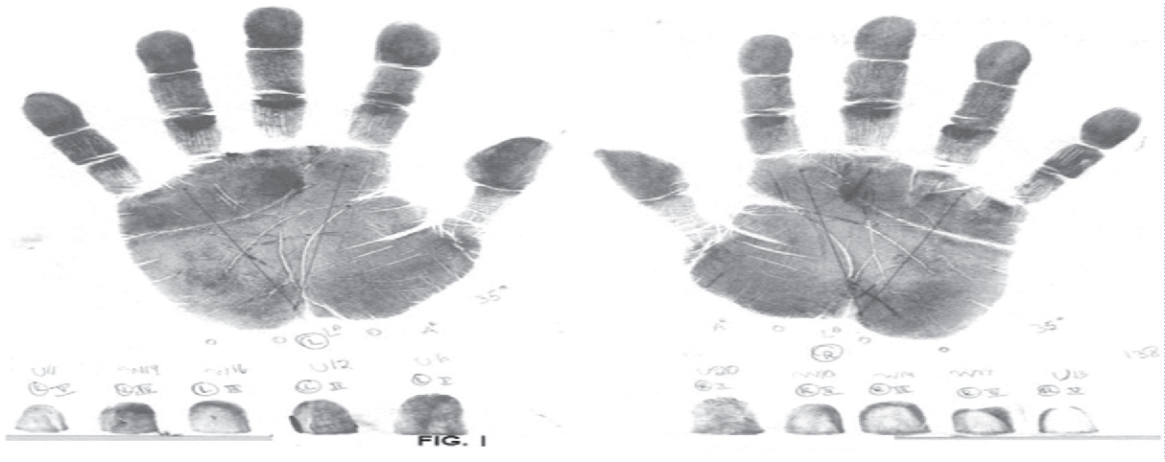

Figure 1. Finger and palm print

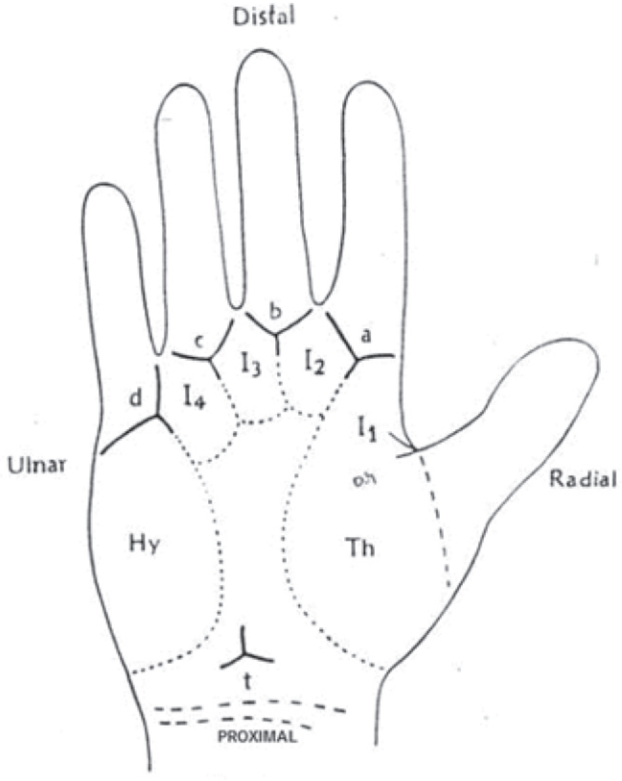

Figure 2. Palmar dermatoglyphic pattern

Figure 3. Method of counting finger ridges

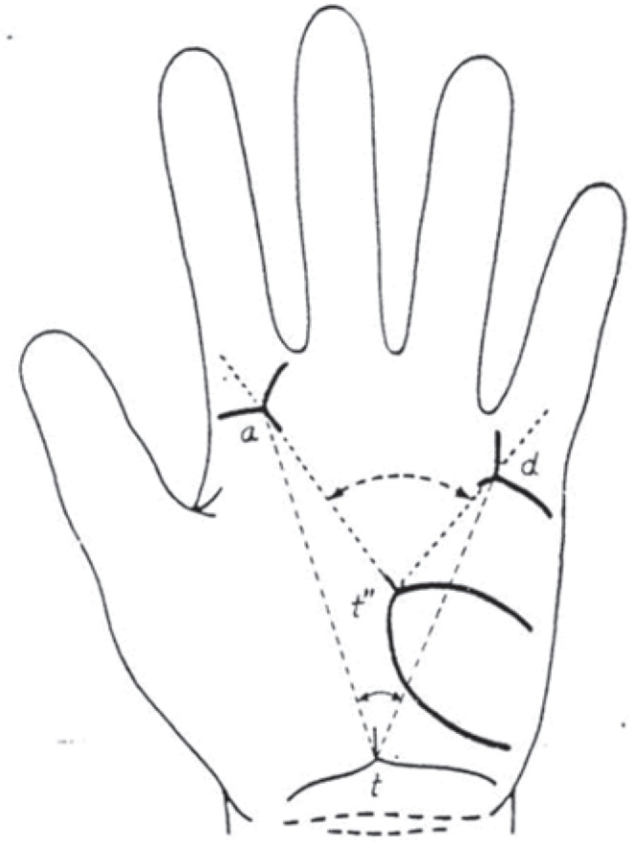

Figure 4. Maximal and minimal atd angles

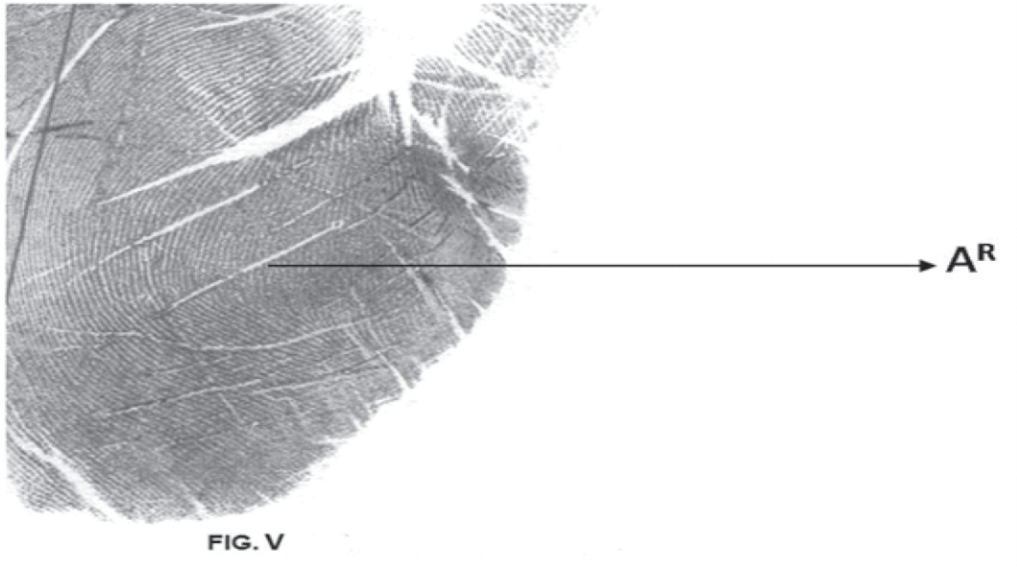

Figure 5. I_1 area pattern : arch radial (A^R)

Discussion

Oral submucous fibrosis (OSMF) is a chronic,complex,irreversible,highly potent pre-cancerous condition characterized by juxta-epithelial inflammatory reaction and progressive fibrosis of the submucosal tissues (lamina propria and deeper connective tissues). As the disease progresses, the jaws become rigid to the point that the sufferer is unable to open his mouth[5]. The condition is linked to oral cancers and is associated with areca nut chewing, the main component of betel quid. It has been found that exposure of buccal mucosal fibroblasts to alkaloid invitro may contribute to the accumulation of collagen in OSMF. The copper content of arecanut has also been implicated in the pathogenesis of OSMF. Further, collagenase activity has been found to be lower in OSMF than in normal oral mucosa. This evidence implies that individual variability in collagen metabolism might explain the individual variability in disease susceptibility [6].

Areca nut or betel quid chewing, a habit similar to tobacco chewing, is practiced predominately in Southeast Asia and India, dating back thousands of years. Several studies have been conducted and some are in progress with regards to dermatoglyphics and various disease conditions.Studies conducted by Penrose in 1969 revealed that the most typical dermatoglyphic finding was a strikingly high frequency of arches on the fingertips. The atd angle was often increased. Another study conducted in Trisomy 13 by the same author showed a marked increase of patterns in the thenar areas of the patients [7]. Dallapiccola et al. 1972 identified five dermatoglyphic characteristics (Total finger Ridge Count, maximal atd angle, T line termination in second interdigital area and presence of hypothenar patterns on the palms) which show significant differences in frequency between patients with Turner Syndrome and normal females [8]. Silver in 1966 investigated the fingertips, third interdigital area, and hallucal patterns of 71 patients, 60 having cleft lip and palate, 03 having cleft lip only and 08 having cleft palate only. He found no significant difference in any dermatoglyphic configurations between patients and controls [9]. Adams and Niswander in 1967 studied only the atd angle in patients with cleft lip with or without cleft palate. They observed an increased

asymmetry of atd angles in the group of patients with familial cleft lip with or without cleft palate [10]. A number of studies of dermatoglyphics in patients with leukemia have been carried out since Aleksandrowicz et al. reported an increased frequency of fingertip radial loops in males and of "radial whorls" in females [11]. M. L. Pursani et al in 1989 studied dermatoglyphic parameters in 100 cases of essential hypertension in comparison to 15 healthy controls. The features studied were frequency and distribution of digit pattern, TFRC, axial triradii and mean atd angle. No significant difference was found in digit pattern. They found a significant increase in total finger ridge count and absolute finger ridge count. A decrease in the atd angle was observed in both the studies. They have reported absence of axial triradii in case of hypertensives as compared to control in both sexes [12]. It is stated that individuals who are genetically predisposed to OSMF are susceptible to the condition[1].If a marker of OSMF is found, then the younger population can be screened and a person in the prefibrosis stage can be recognized and various control measures like abandoning of gutkha chewing habit can be advised. This can lead to prevention of OSMF in the population.Taking these facts into consideration, we have tried to determine significant palmar dermatoglyphic parameters in OSMF patients and find whether a correlation exists between OSMF and palmar dermatoglyphics. Hardly, any studies have been conducted on dermatoglyphics in OSMF. These parameters can be used for screening purpose for early detection of OSMF The present work on dermatoglyphics in oral sub mucous fibrosis has determined few significant parameters applicable to OSMF in North Karnataka population.Significant findings in qualitative analyses of OSMF patients include;Increase in frequency of arches, both hands taken together.Decrease in frequency of simple whorls, both hands taken together.Increase in pattern frequency in thenar/I_1 area in both hands.Significant findings in quantitative analysis of OSMF patients include;Decrease in atd angle in both right and left hands.

Table 1. Frequency of finger print pattern in all three study groups

Pattern		OSMF Cases (N=50)	Control Group With Gutkha (N=50)	Control Group Without Gutkha (N=50)	X^2	P
Arches		029 (05.8%)	022 (04.40%)	007 (01.40%)	13.606	0.0011
Loops	Ulnar	294 (58.8%)	302 (60.40%)	267 (53.40%)	05.503	0.0638
	Radial	008 (01.6%)	009 (01.80%)	010 (02.00%)	00.226	0.8932
Whorls	True	148 (29.6%)	138 (27.60%)	178 (35.60%)	08.118	0.0173
	Comp	022 (04.4%)	032 (06.40%)	036 (07.20%)	03.688	0.1583

Table 2. Frequency of thenari I Area pattern in 3 study groups

	NUMBER	RIGHT HAND		LEFT HAND	
		MEAN	S. D.	MEAN	S. D.
OSMF Cases	50	40.64	05.45	40.58	05.89
Control with Gutkha	50	44.66	08.38	44.48	09.12
Control without Gutkha	50	44.24	09.00	44.36	08.20

Conclusion

Currently, several dermatoglyphic research workers, claim a very high degree of accuracy, in their prognostic ability, from the hand's features. Thus with the help of above mentioned parameters, a gutkha chewer developing OSMF can be detected. They can be considered as genetic markers to detect individuals genetically predisposed to this condition . He can be motivated to leave the habit of gutkha chewing. Thereby, we can work towards prevention of oral sub mucous fibrosis which can turn to be a malignant condition in later life.

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