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Dermatoglyphic Study: A Diagnostic Tool for Predicting Oral Submucous Fibrosis

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Abstract

Aim: The aim of the study was to observe and compare the dermatoglyphics patterns in betel nut chewers with and without oral submucous fibrosis. **Materials and Methods:** A cross-sectional study was carried out among patients of either gender visiting the outpatient Department of Oral Medicine and Radiology, of Ahmedabad Dental College and Hospital. A sample size of 100 subjects was decided and was divided into three groups: Group 1: 50 subjects with habit of eating betel nuts and OSMF. Group 2: 25 subjects with habit of eating betel nuts without OSMF. Group 3: 25 subjects without a habit of betel nuts chewing and not having OSMF. The ink was uniformly applied over the fingers by using a stamp pad. Prints of fingertips were taken. **Results:** On comparing the dermatoglyphic patterns with subjects of groups 1, 2 and 3, OSMF subjects had an increase in simple whorl patterns and a decrease in arch patterns, and subjects with a habit of betel nut chewing without OSMF had an increase in ulnar and radial loop patterns. **Conclusion:** The present study was undertaken to observe and compare the dermatoglyphic patterns in betel nut chewers with and without oral submucous fibrosis. On digit vise comparison of the finger ridge patterns of both hands, the middle finger and ring finger of the right hand showed statistically significant p values. Thus, with the help of these parameters, gutkha chewers likely to develop OSMF can be detected earlier and the cost burden associated with genetic cytomarkers may also be prevented.

Keywords: Dermatoglyphic Patterns, Loops, Oral Submucous Fibrosis, Whorls

Introduction

Oral submucous fibrosis, a precancerous lesion is a chronic disease that affects the oral mucosa, as well as the pharynx and the upper 2/3rd of the esophagus. It occurs mainly due to areca nut chewing, and also genetics is an important predisposing factor[1].

The etiology of OSMF is multifactorial, but betel nut chewing is the main causative agent. There are two possible overlapping mechanisms: autoimmune factors and genetic predisposition.

The available epidemiological evidence suggests that chewing *gutkha* (areca nut) is an important risk factor for OSMF, but not all *gutkha* chewers develop OSMF. Genetic predisposition explains such individual variability. This unique genetic predisposition to diseases may be related to the dermatoglyphics pattern of an individual, which is also genetically determined[2,4].

"Dermatoglyphics" (Derma = skin), (Glyph = carving) refers to the study of naturally occurring patterns on the surface of the hands and feet of human beings. Dermatoglyphics patterns are genetically determined and

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remain unchanged from birth to death. Studying different types of dermatoglyphics patterns can determine a number of parameters, which could help with the diagnose and treatment of various diseases and be considered a stable marker. As a result, it has the potential to be a valuable diagnostic tool for oral diseases such as dental caries, oral cancer, bruxism, malocclusion, anomalies of teeth, cleft lip, cleft palate, periodontal diseases, and dental fluorosis[1,2].

Dermal ridges develop about the fetal volar pads; the formation of these pads is first visible on the fingertips during the 6-7th week of embryonic development. 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 growth could influence the ridge patterns. The arch, loop, whorl pattern and 'atd, dat and adt' palmar angles are the three major fingerprint patterns[1].

The dermatoglyphic investigation is cost-effective and requires no hospitalization, and it can help in predicting the phenotype of a possible future illness. Hence, the present study is carried out to qualitatively analyze the fingertip patterns among betel nut chewers with and without OSMF[3].

Aim and Objectives

- Aim:
  - ✓ To observe and compare the dermatoglyphic patterns in betel nut chewers with and without oral submucous fibrosis.
- **Objectives:**
  - ✓ Correlating habit index with dermatoglyphics.
  - ✓ To assess the dermatoglyphics patterns of subjects with OSMF.
  - ✓ Correlating various stages of OSMF with dermatoglyphics.

Materials and Methods

Source of Data

A cross-sectional study was carried out among patients of either gender visiting the Outpatient Department of Oral Medicine and Radiology, of Ahmedabad Dental College and Hospital. The ethical clearance was obtained from the Institutional Ethical Review Board.

Method of Collection of Data

Sample Size

A sample size of 100 subjects was decided and was divided into three groups:

Group 1 - 50 subjects with the habit of eating betel nuts and having oral submucous fibrosis (OSMF).

Group 2 - 25 subjects with the habit of eating betel nuts but not having OSMF.

Group 3 - 25 subjects with no habit of eating betel nuts and not having OSMF (control group).

Inclusion Criteria

- Subjects chewing tobacco or betel nuts for more than a year with or without other forms of tobacco use.
- Subjects with restricted oral opening, palpable fibrous bands and/or burning sensation of mucosa were included in the study group.

Exclusion Criteria

- Betel nut chewers with any other oral lesions other than OSMF.
- The presence of oral lesions may be due to other causes, such as sharp tooth margins, improper restorations, prosthesis, alcohol or smoking.
- Subjects with scars or any digit injuries.
- Subjects with any systemic diseases.

Study Method

- Subjects fulfilling the above criteria were thoroughly explained the study procedure in the language that they understand (Patient information sheet-Annexure I).
- For subjects who were ready to participate written informed consent was being taken (Informed consent – Annexure-II).
- History of habit was taken in detail in case history proforma specially made for this study (Annexure-III).
- The oral examination for OSMF staging was done according to Khanna and Andrade's classification of OSMF (Annexure-IV).
- Following the history and clinical examination, dermatoglyphic prints were taken.

Procedure of Proper Study

Procedure for Obtaining Prints

It is necessary to remove oil, dirt, and sweat from the skin. This was accomplished by washing the ridged areas with soap and water followed by drying. Then ink was uniformly applied over the fingers by using a stamp pad. Prints of fingertips were taken. Once satisfactory prints of the fingers were obtained, the patient was asked to wash his hands with soap and water and wipe them with a napkin. Subject's right-hand digits and left-hand digits were pressed in the ink pad followed by pressing it firmly against the bond paper and analysis was done with magnifying lens.

Analysis of Prints

Using an official proforma, essential information was recorded. This data included age, sex, address, history of betel nut/ gutkha chewing, and other medical histories of importance.

Fingertip patterns were studied regarding, Simple Arches (SA), Tented Arches (TA), Ulnar Loops (UL), Radial Loops (RL), Simple Whorls (SW), Compound Whorls (CW), Double Loop Whorls (DLW) and Central Pocket Loops (CPL).

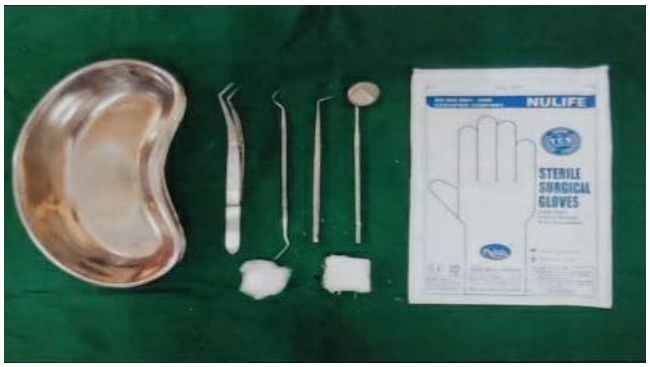

Figure 1. Clinical examination armamentarium.

Figure 2. Armamentarium for proper study.

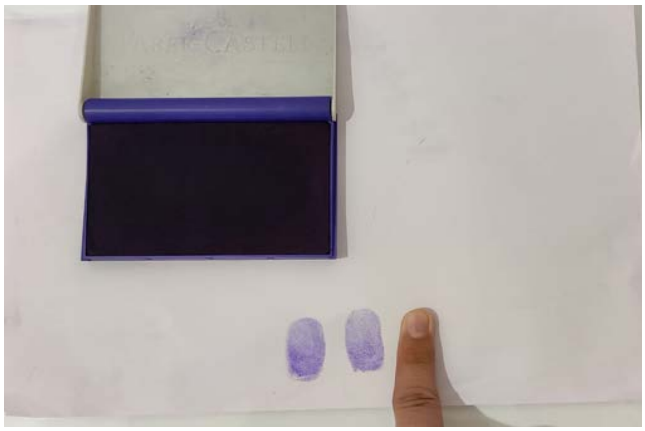

Figure 3. Procedure of fingerprint recording.

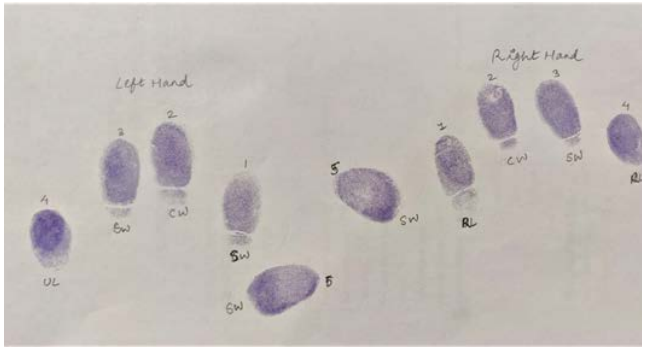

Figure 4. Analysis of fingerprints.

Table 1. Demonstrates distribution of the subjects of the group 1, 2 and 3 in different age groups

AGE (YEARS)	GROUP 1	GROUP 2	GROUP 3	TOTAL
11-20	3(6.0%)	2(8.0%)	7(28.0%)	12(12%)
21-30	12(24.0%)	6(24.0%)	15(60.0%)	33(33%)
31-40	10(20.0%)	6(24.0%)	2(8.0%)	18(18%)
41-50	11(22.0%)	4(16.0%)	1(4.0%)	16(16%)
51-60	10(20.0%)	2(8.0%)	0(0.0%)	12(12%)
61-70	4(8.0%)	4(16.0%)	0(0.0%)	8(8%)
71-80	0(0.0%)	1(4.0%)	0(0.0%)	1(1%)
TOTAL	50(50%)	25(25%)	25(25%)	100(100%)
P = 0.001 Cramer's V = 0.406 (Shows strength of association)				

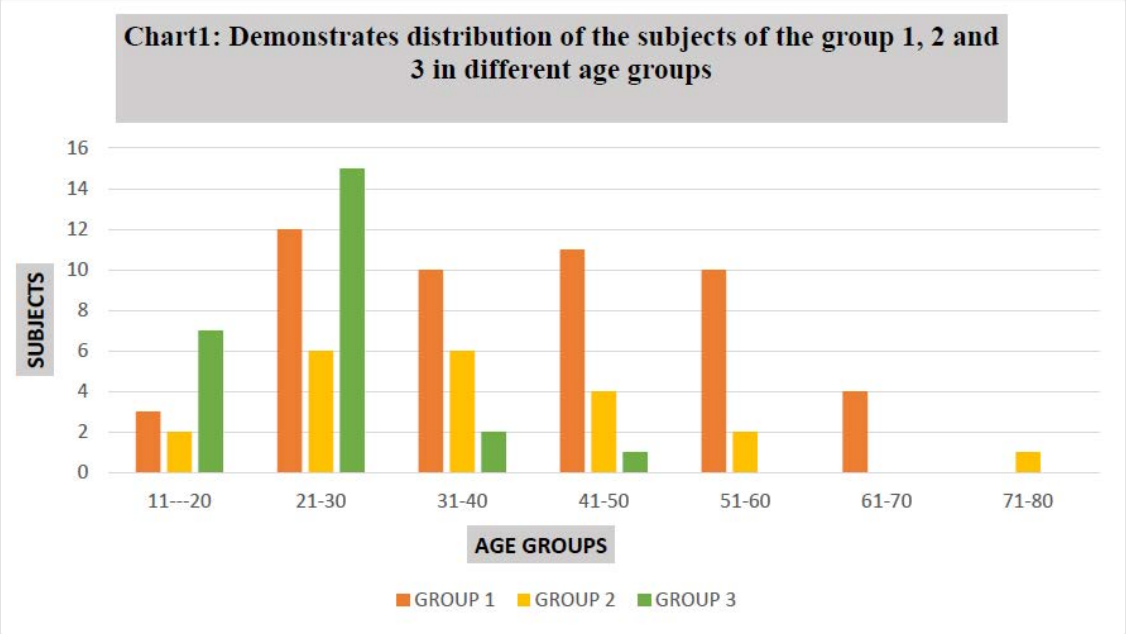

Chart 1. Demonstrates distribution of the subjects of the group 1, 2 and 3 in different age groups.

Table 2. Demonstrates distribution of the subjects of groups 1, 2 and 3 according to gender

	Males	Females	Total
Group 1	47(94.0%)	3(6.0%)	50(50.0%)
Group 2	20(80.0%)	5(20.0%)	25(25.0%)
Group 3	13(52.0%)	12(48.0%)	25(25.0%)
Total	80(80.0%)	20(20.0%)	100(100%)
P = 0.001 Cramer's V = 0.406 (shows strength of association)			

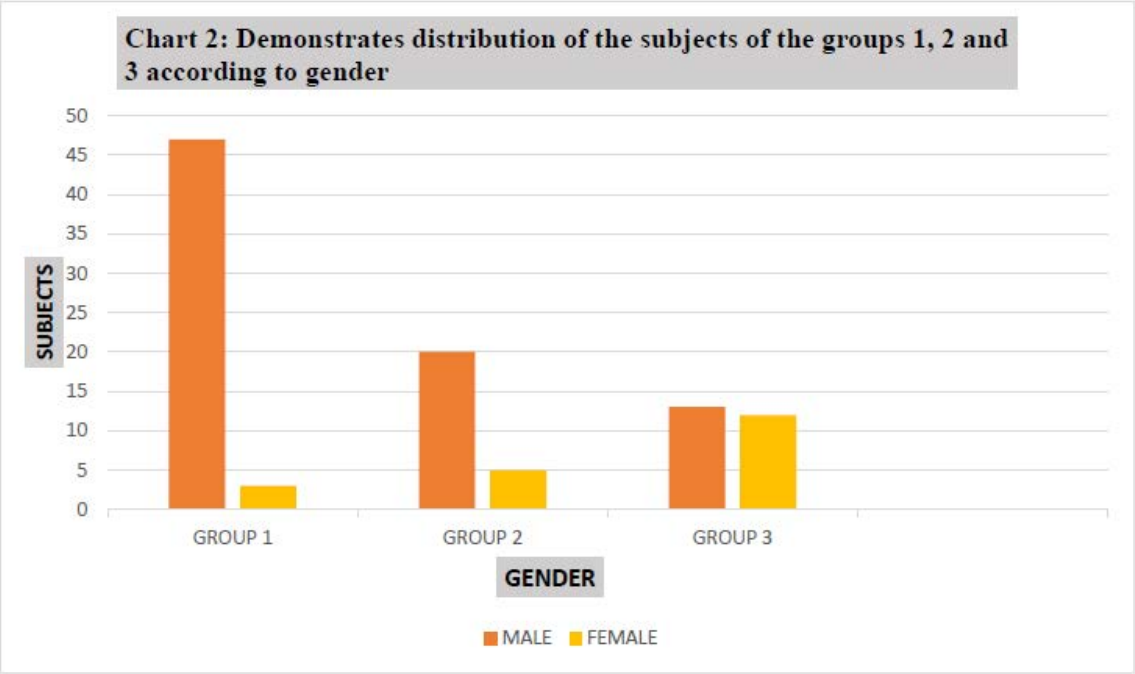

Chart 2. Demonstrates distribution of the subjects of the groups 1, 2 and 3 according to gender.

Table 3. Demonstrates the distribution of burning sensation, ulceration and reduced mouth opening according to different clinical staging of OSMF in group 1

			Burning Sensation		Total	Ulceration		Total	Reduced mouth opening		Total
			Absent	Present		Absent	Present		Absent	Present	
CLINICAL STAGING OF OSMF	OSMF stage I	Count	2	7	9	8	1	9	9	0	9
		%	22.2%	77.8%	100.0%	88.9%	11.1%	100.0%	100.0%	0.0%	100.0%
	OSMF stage II	Count	8	11	19	17	2	19	14	5	19
		%	42.1%	57.9%	100.0%	89.5%	10.5%	100.0%	73.7%	26.3%	100.0%
	OSMF stage III	Count	1	12	13	13	0	13	5	8	13
		%	7.7%	92.3%	100.0%	100.0%	0.0%	100.0%	38.5%	61.5%	100.0%
	OSMF stage IV	Count	2	7	9	9	0	9	4	5	9
		%	22.2%	77.8%	100.0%	100.0%	0.0%	100.0%	44.4%	55.6%	100.0%
Total		Count	63	37	100	97	3	100	82	18	100
		%	63.0%	37.0%	100.0%	97.0%	3.0%	100.0%	82.0%	18.0%	100.0%

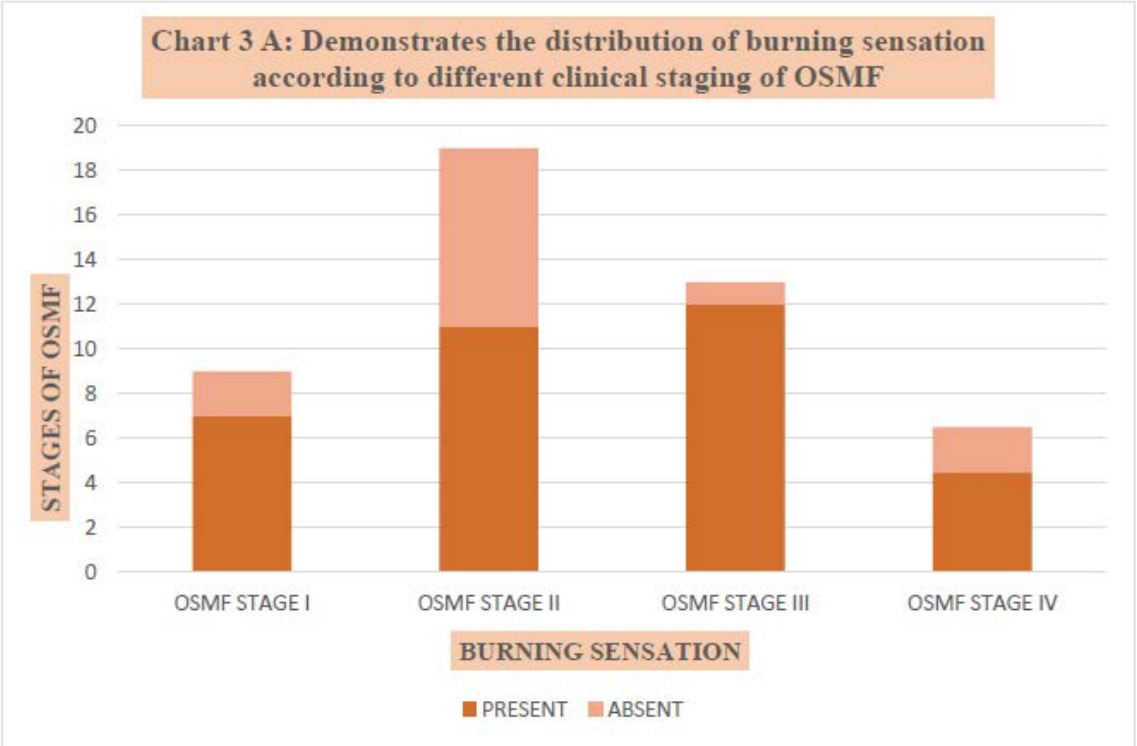

Chart 3 A. Demonstrates the distribution of burning sensation according to different clinical staging of OSMF.

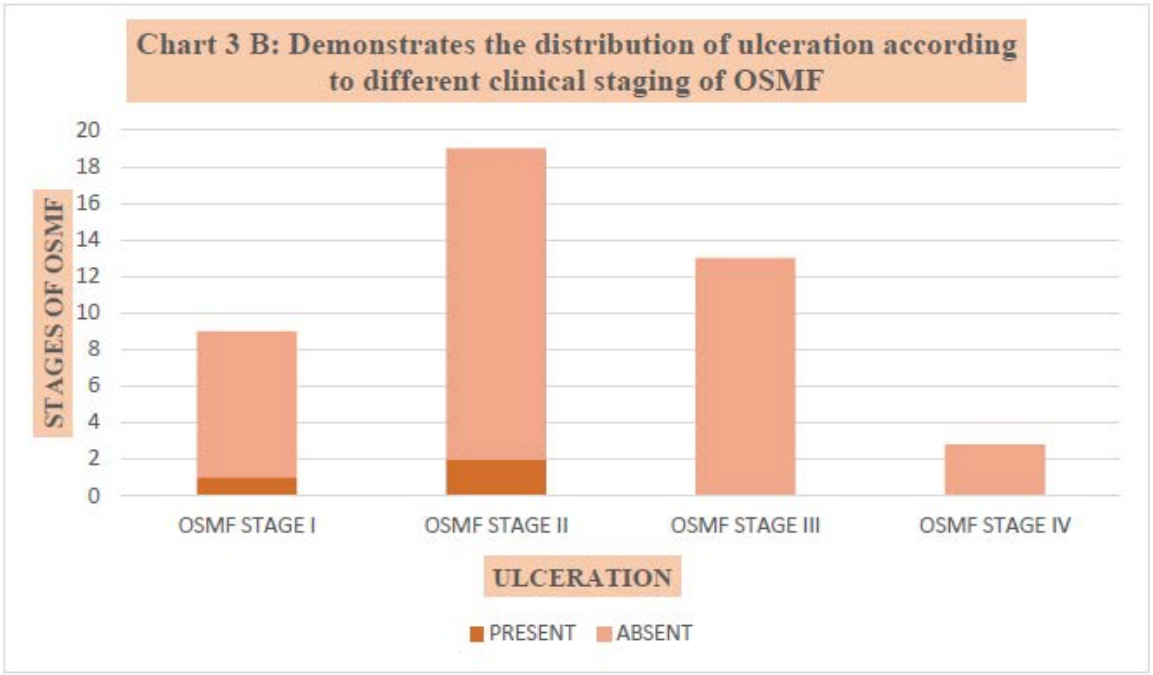

Chart 3 B. Demonstrates the distribution of ulceration according to different clinical staging of OSMF.

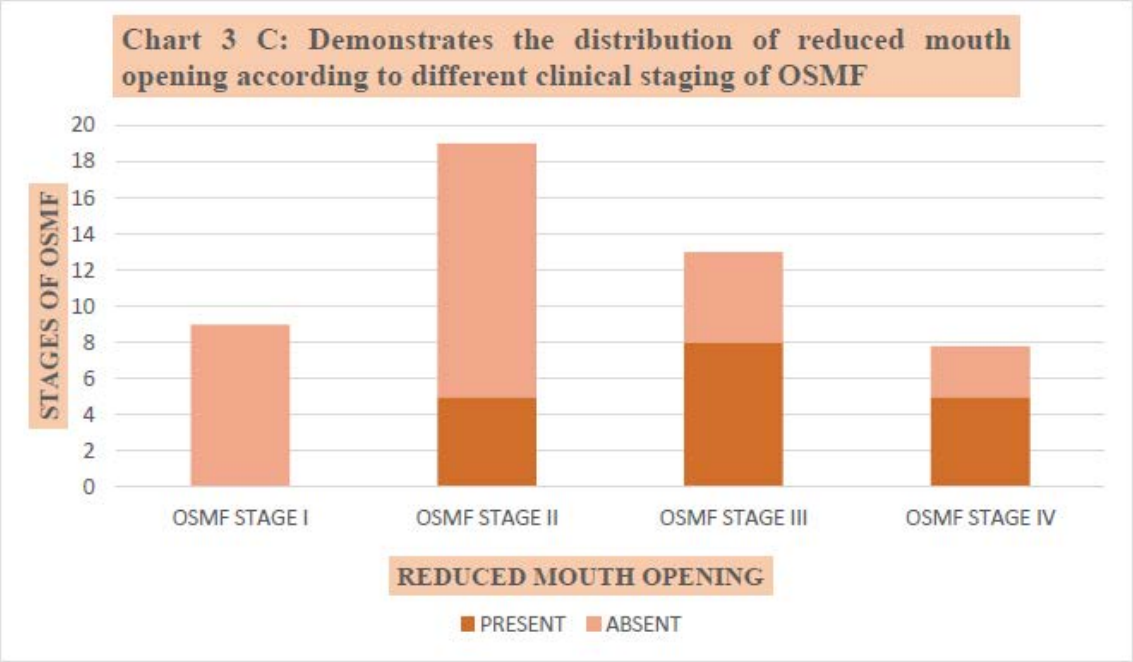

Chart 3 C. Demonstrates the distribution of reduced mouth opening according to different clinical staging of OSMF.

Table 4. Demonstrates a comparison of finger ridge patterns of the left hand among subjects of groups 1, 2 and 3

GROUPS	LEFT HAND	COMPOUND WHORL	SIMPLE WHORL	DOUBLE LOOP WHORL	ULNAR LOOP	RADIAL LOOP	CENTRAL POCKET LOOP	SIMPLE ARCH	TENTED ARCH	TOTAL	P-VALUE
GROUP 1	THUMB	14(28.0%)	16(32.0%)	0(0.0%)	19(38.0%)	0(0.0%)	0(0.0%)	1(2.0%)	0(0.0%)	50(100.0%)	
	INDEX	4(8.0%)	24(48.0%)	0(0.0%)	11(22.0%)	1(2.0%)	0(0.0%)	3(6.0%)	7(14.0%)	50(100.0%)	
	MIDDLE	7(14.0%)	14(28.0%)	0(0.0%)	22(44.0%)	0(0.0%)	3(6.0%)	3(6.0%)	1(2.0%)	50(100.0%)	
	RING	0(0.0%)	33(66.0%)	1(2.0%)	10(20.0%)	0(0.0%)	2(4.0%)	0(0.0%)	4(8.0%)	50(100.0%)	
	LITTLE	2(4.0%)	15(30.0%)	0(0.0%)	31(62.0%)	0(0.0%)	1(2.0%)	1(2.0%)	0(0.0%)	50(100.0%)	
GROUP 2	THUMB	4(16.0%)	4(16.0%)	1(2.0%)	14(56.0%)	0(0.0%)	0(0.0%)	2(8.0%)	0(0.0%)	25(100.0%)	
	INDEX	2(8.0%)	7(28.0%)	0(0.0%)	13(52.0%)	0(0.0%)	1(4.0%)	1(4.0%)	1(4.0%)	25((100.0%)	
	MIDDLE	0(0.0%)	7(28.0%)	0(0.0%)	13(52.0%)	0(0.0%)	0(0.0%)	4(16.0%)	1(4.0%)	25(100.0%)	
	RING	1(4.0%)	9(36.0%)	2(8.0%)	10(40.0%)	0(0.0%)	1(4.0%)	1(4.0%)	1(4.0%)	25(100.0%)	
	LITTLE	0(0.0%)	4(16.0%)	1(4.0%)	15(60.0%)	0(0.0%)	2(8.0%)	3(12.0%)	0(0.0%)	25(100.0%)	
GROUP 3	THUMB	7(28.0%)	8(32.0%)	1(4.0%)	9(36.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	25(100.0%)	
	INDEX	0(0.0%)	10(40.0%)	1(4.0%)	8(32.0%)	1(4.0%)	0(0.0%)	1(4.0%)	4(16.0%)	25(100.0%)	
	MIDDLE	1(4.0%)	6(24.0%)	2(8.0%)	13(52.0%)	0(0.0%)	0(0.0%)	2(8.0%)	1(4.0%)	25(100.0%)	
	RING	0(0.0%)	11(44.0%)	1(4.0%)	10(40.0%)	0(0.0%)	1(4.0%)	1(4.0%)	0(0.0%)	25(100.0%)	
	LITTLE	0(0.0%)	5(20.0%)	3(12.0%)	15(60.0%)	0(0.0%)	0(0.0%)	2(8.0%)	0(0.0%)	25(100.0%)	
TOTAL	THUMB	25(25.0%)	42(42.0%)	2(2.0%)	42(42.0%)	0(0.0%)	0(0.0%)	3(3.0%)	0(0.0%)	100%	0.254
	INDEX	6(6.0%)	41(41.0%)	1(1.0%)	32(32.0%)	2(2.0%)	1(1.0%)	5(5.0%)	0(0.0%)	100%	0.181
	MIDDLE	8(8.0%)	27(27.0%)	2(2.0%)	48(48.0%)	0(0.0%)	3(3.0%)	9(9.0%)	3(3.0%)	100%	0.263
	RING	1(1.0%)	53(53.0%)	4(4.0%)	30(30.0%)	0(0.0%)	4(4.0%)	2(2.0%)	5(5.0%)	100%	0.071
	LITTLE	2(2.0%)	24(24.0%)	4(4.0%)	61(61.0%)	0(0.0%)	3(3.0%)	6(6.0%)	0(0.0%)	100%	0.097

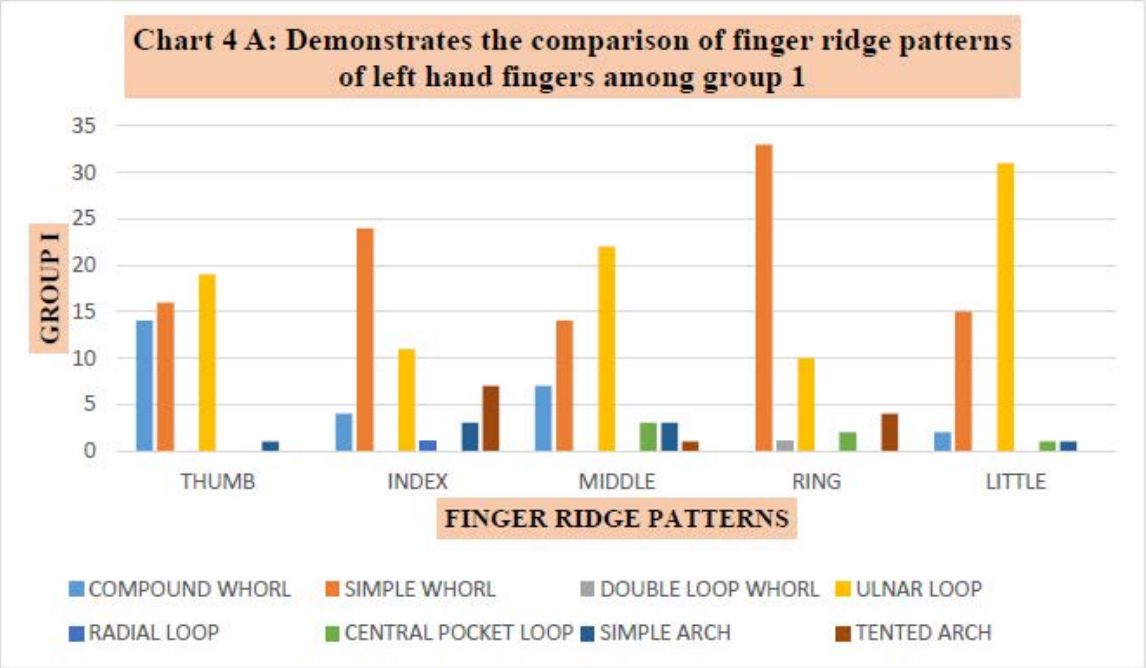

Chart 4 A. Demonstrates the comparison of finger ridge patterns of left hand fingers among group 1.

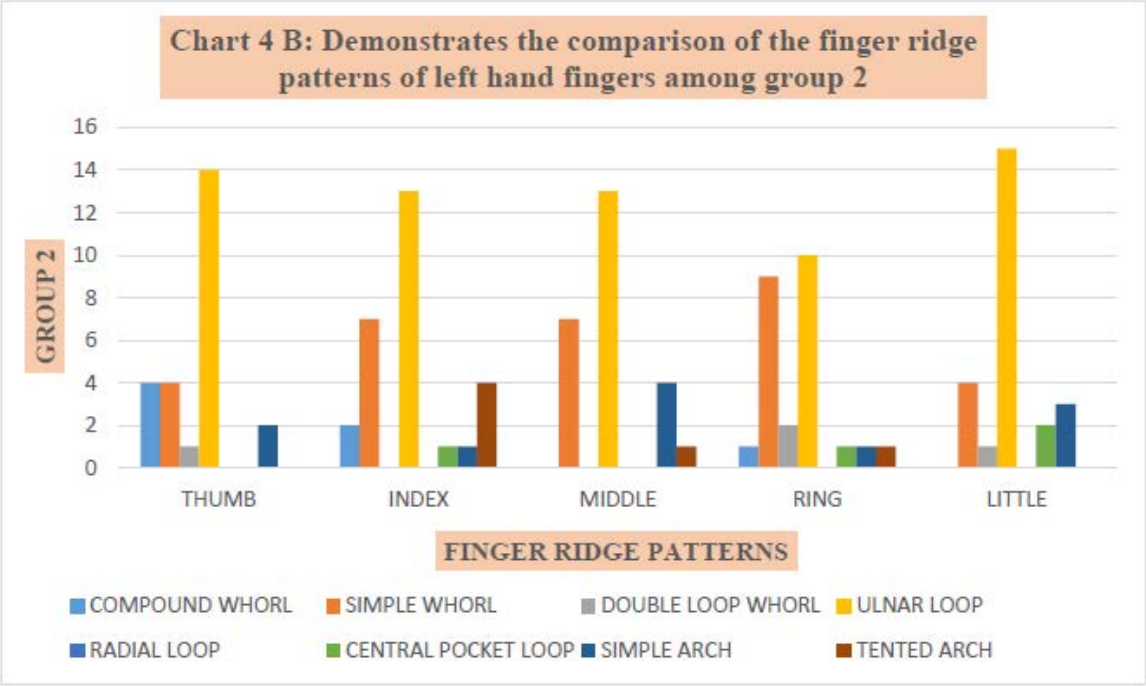

Chart 4 B. Demonstrates the comparison of the finger ridge patterns of left hand fingers among group 2.

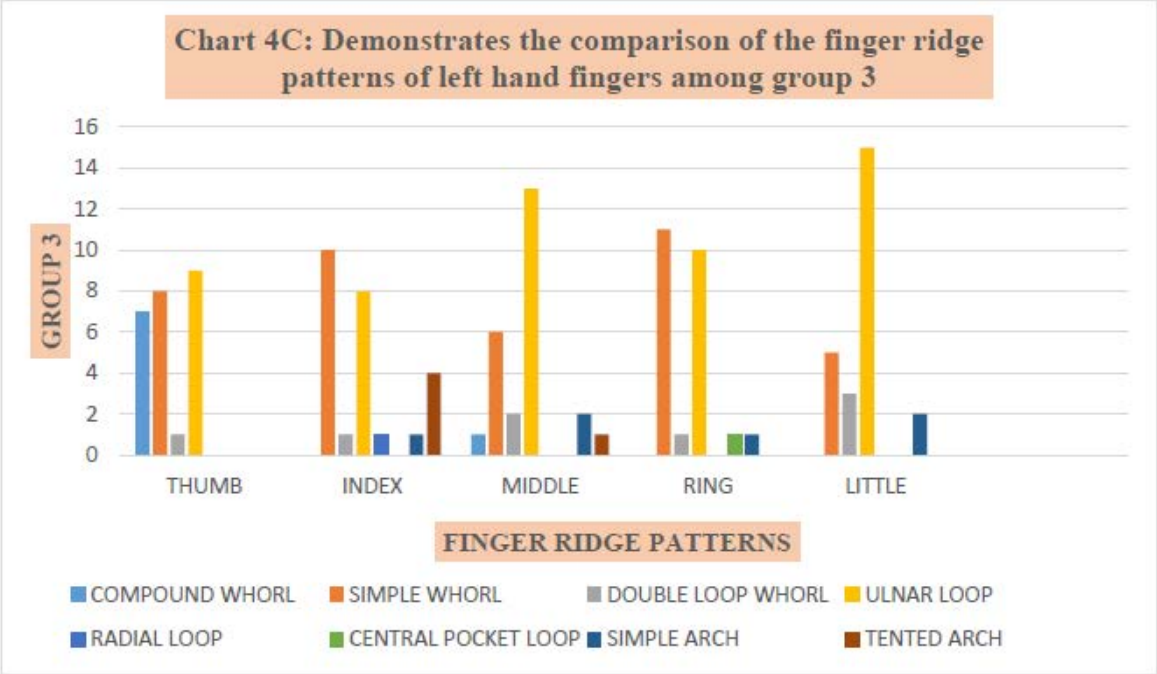

Chart 4 C. Demonstrates the comparison of the finger ridge patterns of left hand fingers among group 3.

Table 5. Demonstrates the comparison of the finger ridge patterns of the left hand fingers among groups 1, 2 and 3

		WHORLS			LOOPS			ARCHES		TOTAL	P and CRAMER'S V
GROUPS	RIGHT HAND	COMPOUNDWHORL	SIMPLE WHORL	DOUBLE LOOP WHORL	ULNAR LOOP	RADIALLOOP	CENTRAL POCKET LOOP	SIMPLE ARCH	TENTED ARCH		
GROUP 1	THUMB	13(26.0%)	20(40%)	0(0.0%)	0(0.0%)	14(28%)	0(0.0%)	1(2.0%)	2(4.0%)	50(100%)	
	INDEX	5(10.0%)	15(30%)	0(0.0%)	4(8.0%)	15(30%)	0(0.0%)	3(6.0%)	4(8.0%)	50(100%)	
	MIDDLE	3(6.0%)	20(40%)	0(0.0%)	0(0.0%)	20(40%)	0(0.0%)	3(6.0%)	4(8.0%)	50(100%)	
	RING	2(4.0%)	36(72%)	0(0.0%)	0(0.0%)	10(20%)	0(0.0%)	1(2.0%)	1(2.0%)	50(100%)	
	LITTLE	3(6.0%)	15(30%)	0(0.0%)	1(2.0%)	26(52%)	1(2.0%)	3(6.0%)	1(2.0%)	50(100%)	
GROUP 2	THUMB	4(16.0%)	9(36.0%)	0(0.0%)	0(0.0%)	10(40%)	0(0.0%)	1(4.0%)	9(36.0%)	25(100%)	
	INDEX	4(16%)	8(32%)	1(4%)	0(0%)	7(28%)	0(0%)	2(8%)	3(12%)	25(100%)	
	MIDDLE	0(0%)	3(12%)	0(0%)	0(0%)	20(80%)	0(0%)	1(4%)	1(4%)	25(100%)	
	RING	1(4%)	8(32%)	1(4%)	0(0%)	11(44%)	0(0%)	2(8%)	2(8%)	25(100%)	
	LITTLE	1(4%)	6(24%)	0(0%)	1(4%)	12(48%)	1(4%)	3(12%)	1(4%)	25(100%)	
GROUP 3	THUMB	4(16%)	8(32%)	1(4%)	0(0%)	12(48%)	0(0%)	0(0%)	8(32%)	25(100%)	
	INDEX	1(4%)	7(28%)	1(4%)	1(4%)	8(32%)	0(0%)	1(4%)	5(20%)	25(100%)	
	MIDDLE	1(4%)	2(8%)	1(4%)	2(8%)	14(56%)	0(0%)	1(4%)	4(16%)	25(100%)	
	RING	0(0%)	10(40%)	1(4%)	1(4%)	9(36%)	1(4%)	1(4%)	2(8%)	25(100%)	
	LITTLE	0(0%)	3(12%)	1(4%)	0(0%)	14(56%)	1(4%)	4(16%)	2(8%)	25(100%)	
TOTAL	THUMB	21(21%)	37(37%)	1(1%)	0(0%)	36(36%)	0(0%)	2(2%)	37(37%)	100%	0.617
	INDEX	10(10%)	30(30%)	2(2%)	5(5%)	30(30%)	0(0%)	8(8%)	14(14%)	100%	0.765
	MIDDLE	4(4%)	25(25%)	1(1%)	2(2%)	54(54%)	0(0%)	5(5%)	9(9%)	100%	0.004, 0.336
	RING	3(3%)	54(54%)	2(2%)	1(1%)	30(30%)	1(1%)	4(4%)	5(5%)	100%	0.011, 0.332
	LITTLE	4(4%)	24(24%)	1(1%)	2(2%)	52(52%)	3(3%)	10(10%)	4(4%)	100%	0.561

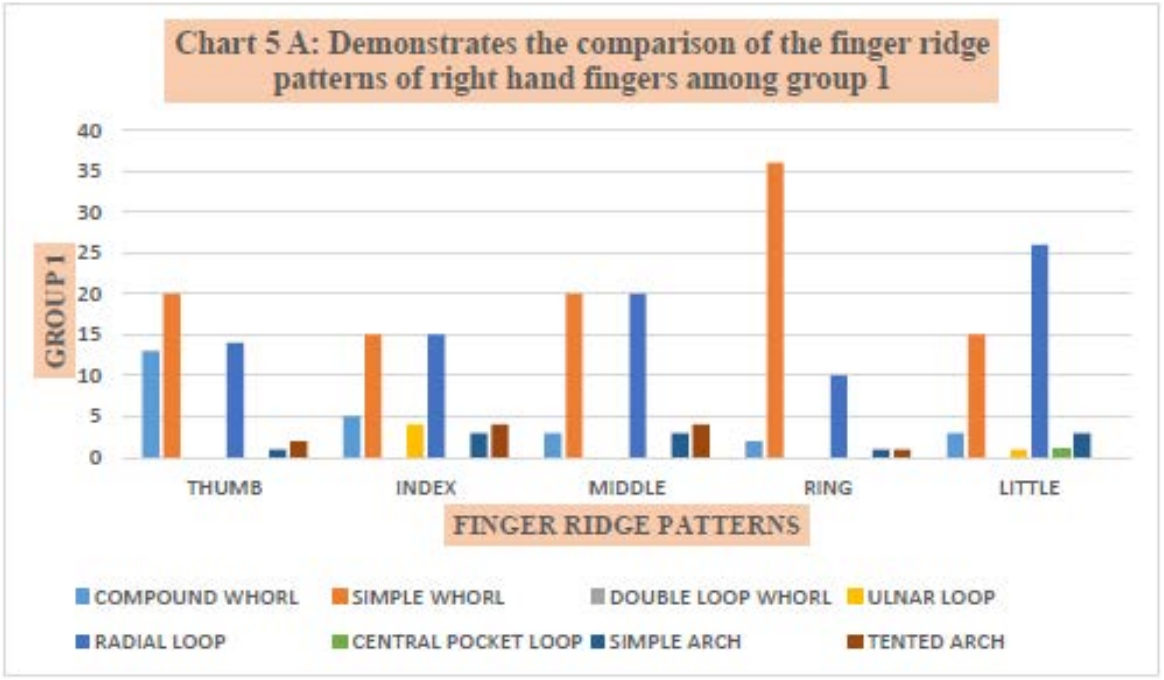

Chart 5 A. Demonstrates the comparison of the finger ridge patterns of right hand fingers among group 1.

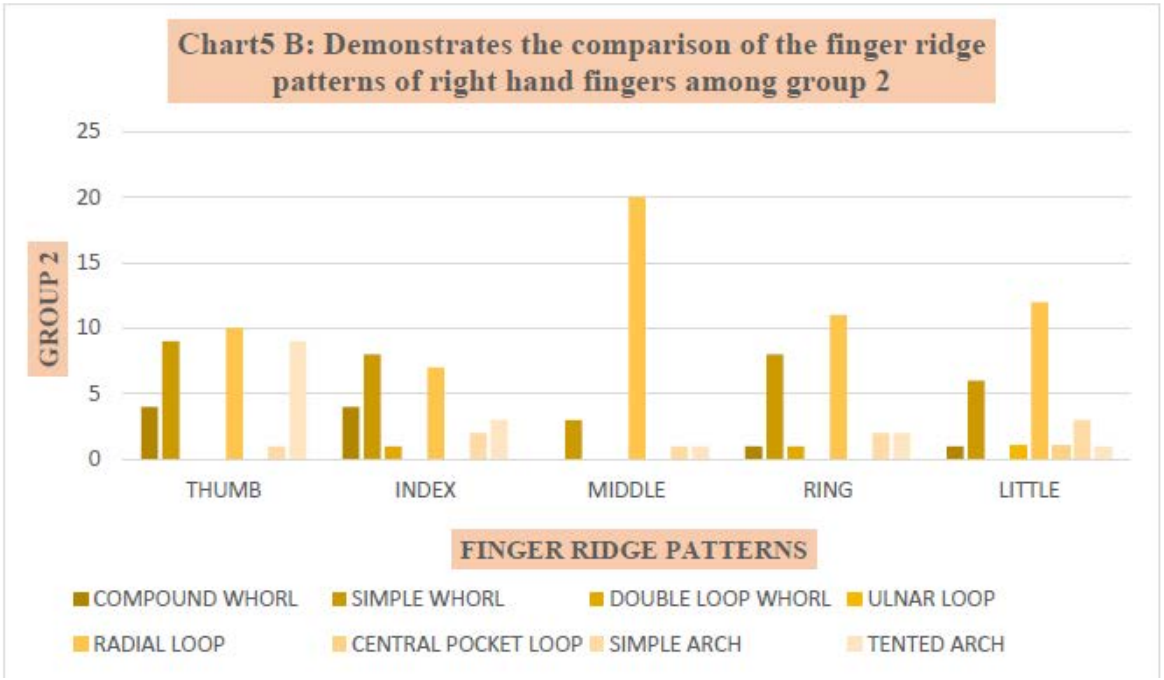

Chart 5 B. Demonstrates the comparison of the finger ridge patterns of right hand fingers among group 2.

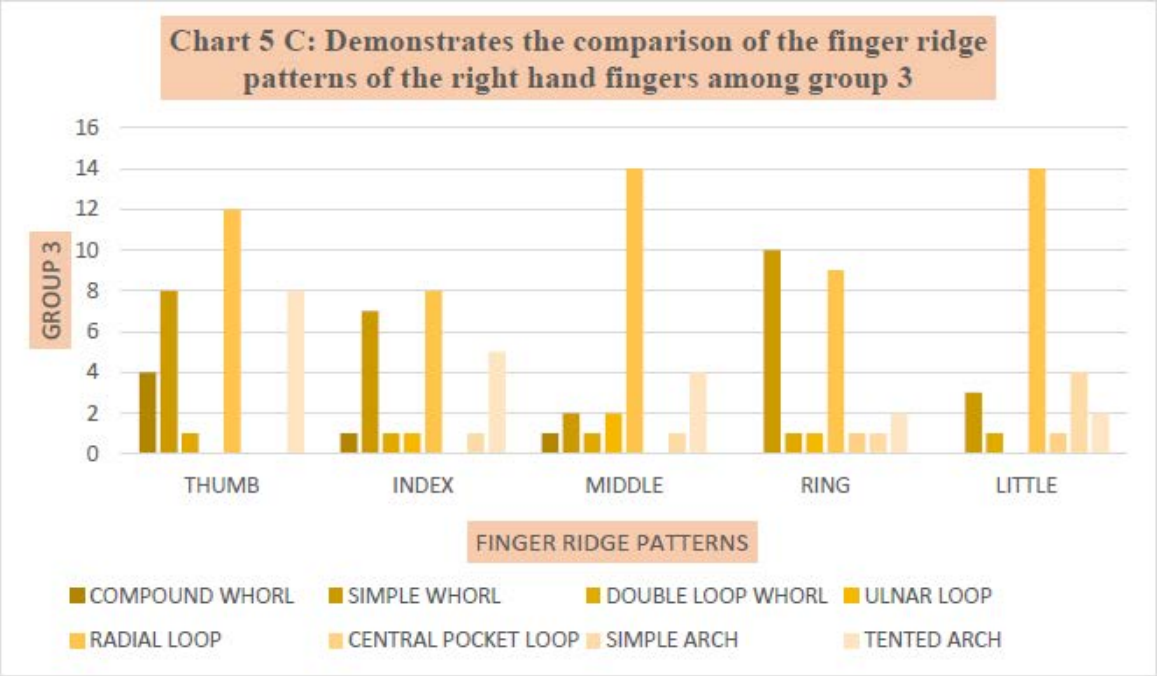

Chart 5 C. Demonstrates the comparison of the finger ridge patterns of the right hand fingers among group 3.

Results

Table 1 and Chart no. 1 demonstrate the distribution of groups 1, 2 and 3 subjects in different age groups. Out of total 100 patients, 12(12%) were in 11-20 age group, 33(33%) were in 21-30 age group, 18(18%) were in 31-40 age group, 16(16%) were in 41-50 age group, 12(12%) in 51-60 age group, 8(8%) in 61-70 age group, 1(1%) in 71-80 age group. Out of 50 patients in group 1, 3(6%) subjects were in 11-20 age group, 12(24%) were in 21-30 age group, 10(20%) were in 31-40 age group, 11(22%) were in 41-50 age group, 10(20%) were in 51-60 age group, 4(8%) were in 61-70 age group and no subject in 71-80 age group. Out of 25 patients in group 2, 2(8%) were in 11-20 age group, 6(24%) were in 21-30 age group, 6(24%) were in 31-40 age group, 4(16%) were in 41-50 age group, 2(8%) were in 51-60 age group, 4(16%) were in 61-70 age group, 1(4%) were in 71-80 age group. Out of 25 patients in group 3, 7(8%) were in 11-30 age group, 15(60%) were in 21-30 age group, 2(8.0%) were in 31-40 age group, 1(4%) were in 41-50 age group, no subjects were present in 51-60, 61-70 and 71-80 age groups. P = 0.001 which was statistically significant. (P < 0.05 was considered significant).

Table 2 and Chart no. 2 demonstrate the distribution of group 1, 2, 3 subjects according to gender. Out of the total of 100 patients, 80% were males and 20% were females. Out of 50 subjects of group 1, 47(94%) were males and 3(6%) were females. In group 2, out of 25 patients, 20(80%) were males and 5(20%) were females. In group 3, out of 25 patients, 13(52%) were males and 12(48%) were females. P = 0.001 which was statistically significant. (P < 0.05 was considered significant).

Table 3 and Chart no. 3 (A, B, C) demonstrate distribution of burning sensation, ulceration and reduced mouth opening (chief complaints) in different clinical staging of OSMF. Out of 50 patients in group 1, in OSMF stage 1, 7(77.8%) had burning sensation. In OSMF stage II, 11(57.9%) had burning sensation. In OSMF stage III, 12(92.3%) had burning sensation. In OSMF stage IV, 7(77.8%) had burning sensation. P = 0.001 was statistically significant (P < 0.05 was considered statistically significant).

Out of 50 patients in group 1, in OSMF stage I, 1(11.1%) had ulceration. In OSMF stage II, 2(10.5%) had ulceration. In OSMF stage III ulceration was absent. In OSMF stage IV ulceration was absent. P = 0.093 was non-significant (P < 0.05 was considered statistically significant).

Out of 50 patients in group 1, in OSMF stage I reduced mouth opening was absent. In OSMF stage II, 5(26.3%) had reduced mouth opening. In OSMF stage III, 8(61.5%) had reduced mouth opening. In OSMF stage IV 5(55.6%) had reduced mouth opening. P = 0.001 was statistically significant (P < 0.05 was considered statistically significant).

Table 4 and Chart no. 4 (A, B, C) demonstrates the comparison of finger ridge patterns of fingers of left hand among subjects of Groups 1, 2 and 3.

Out of a total of 100 patients, finger ridge patterns in the thumb of the left hand were as follows: 25% were compound whorls, 42% were simple whorls, 2% were double loop whorls, 3% were simple arch and 42% were ulnar loops P = 0.254 which was statistically non-significant. (P < 0.05 was considered statistically significant).

In the index finger, out of a total of 100 patients, 6(6%) were compound whorls, 41(41%) were simple whorls, 1% were double loop whorls, 32% ulnar loops, 2% radial loops, 1% central pocket loops, 5% simple arch, 12% tented arch. P = 0.181 which was non-significant (P < 0.05 was considered significant).

In the middle finger, out of a total of 100 patients, 8(8%) were compound whorls, 27(27%) were simple whorls, 2(2%) were double loop whorls, 9(9%) were simple arch, 3(3%) were tented arch, 48(48%) were ulnar loops and 3(3%) were central pocket loops. P = 0.263 was insignificant. (P-value < 0.05 was considered significant).

In the ring finger, out of a total of 100 patients, 1% were compound whorls, 53% were simple whorls, 4% were double loop whorls, 2% simple arch, 5% tented arch, 30% ulnar loops, 4% central pocket loops were found. P = 0.071 which was non-significant. (P < 0.05 was considered significant.

In the little finger, out of a total of 100 patients, 2% were compound whorls, 24% were simple whorls, 4% were double loop whorls, 6% were simple arch, 61% were ulnar loops and 3% were central pocket loops. P = 0.097, which was non-significant (P < 0.05 was considered significant).

Table 5 and chart no. 5 (A, B, C) demonstrates the comparison of the finger ridge patterns of right hand fingers among groups 1, 2 and 3.

Out of a total of 100 patients, in the thumb of the right hand, 21% were compound whorls, 37% were simple whorls, 1% were double loop whorls, 2% were simple arch, 37% were tented arch, 26% were radial loops. P = 0.617 was non-significant (P < 0.05 was considered significant).

In the index finger, out of a total of 100 patients, finger ridge patterns in the index finger were, 10% compound whorls, 30% simple whorls, 2% double loop whorls, 8% simple arch, 14% tented arch, 30% radial loops and 5% ulnar loops. P = 0.765 which was non-significant (P < 0.05 was considered significant).

In the middle finger, out of a total of 100 patients, 4% were compound whorls, 25% were simple whorls, 1% were double loop whorls, 5% were simple arch, 9% were tented arch, 54% were radial loops and 2% were ulnar loops. P = 0.004 was considered significant. (P < 0.05 was considered significant). Cramer's V = 0.366 which suggested a strong significant association between the groups (> 0.25 suggests a very strong and significant association).

In the ring finger, out of a total of 100 patients, finger ridge patterns in the right hand were: 1% central pocket loop, 3% compound whorl, 2% double loop whorl, 30% radial loop, 4% simple arch, 54% simple whorl, 5% tented arch, 1% ulnar loop. P = 0.011 which was significant. Cramer's V value = 0.332 which suggested strong significant association between the groups. (>0.25 suggests a very strong and significant association).

In the little finger out of a total of 100 patients, the ridge patterns in the little finger were: 3% central pocket loops, 4% compound whorls, 1% double loop whorls, 52% radial loops, 10% simple arch, 24% simple whorls, 4% tented arch, 2% ulnar loops. P = 0.561, was non-significant (P < 0.05 was considered significant).

Discussion

Oral submucous fibrosis is a chronic, progressive scarring disease that predominantly affects people of South-East Asian origin and is very common in India. It is an insidious chronic disease that can affect any part of the oral cavity and sometimes the pharynx. Although occasionally preceded by or associated with vesicle formation, it is always associated with a juxtaepithelial inflammatory reaction followed by fibro elastic changes of the lamina propria, with epithelial atrophy leading to stiffness of the oral mucosa and causing trismus and an inability to eat.

The present study distributes patients into different age groups. In OSMF patients, maximum patients are present in the age group between 21-30 years suggesting that maximum patients with OSMF were middle-aged which

is in accordance with the study done by Rohit (Sharma, *et al.,* 2012) which shows 28.9% between 25-34 years[6].

The purpose of this study was to observe and compare the dermatoglyphic patterns in betel nut chewers with and without OSMF in accordance with the study conducted by Satish Kumar, *et al*[2]. The objectives include; to assess the dermatoglyphic patterns of subjects with OSMF, correlating the Habit Index with dermatoglyphic and correlating various stages of OSMF with dermatoglyphic which had not been assessed previously by any author.

The study was performed on 100 subjects, who were divided into three groups. Group 1: 50 subjects with the habit of betel nut and oral submucous fibrosis (OSMF). Group 2: 25 subjects with a habit of betel nut but not having OSMF. Group 3: 25 subjects with no habit of betel nut and not having OSMF, which is in accordance to the study conducted by Parvathi Devi Munishwar, *et al*[3].

This study is to document the prevalence of OSMF with a sexual predisposition. This study infers 80% of males and 20% of females, suggesting a male predisposition that is consistent with the study carried out by A. K Jain, *et al.,* (2013) show that the male:female ratio is 2.67:1, which further stated that male predisposition could be due to the easy accessibility of gutkha and other products to males than females in our society and probably females feel uncomfortable in purchasing gutkha products. Also, financial administration is not in the hands of most females limiting their access to such gutkha products.

In the present study, burning sensation and reduced mouth opening were the main chief complaints of OSMF patients, which is in accordance with R. Rajendran (1994) who states that the most common features of OSMF include a burning sensation and reduced mouth opening[15].

The methods used for palm printing are inexpensive and rapid. In our study, we have used the ink method by using a stamp pad, as it is inexpensive and easy to use, and in accordance with the study conducted by P. R. Abhilash (2012)[23].

In the present study, we conducted an analysis of finger ridge patterns that included, simple whorls, compound whorls, ulnar loops, radial loops, a simple arch, and a tented arch, which was in accordance with the study conducted by Tamgier, *et al.,*(2013)[8] and Satish Kumar (2014)[2]. Two more additional patterns, namely double loop whorls and central pocket loops, were included in our study that was not included before.

We did a digit-wise comparison of dermatoglyphic patterns among the three groups in accordance with the study of Parvathi Devi Munishwar, *et al*[3]. Our study did not show any significant results in the digits of the left hand, just like the other study. The other study shows a statistically significant increase in whorl pattern in the Right Index (RI) and Right Ring (RR) fingers. Similarly, our study also showed a strong, significant association in the middle finger and ring finger of the right hand.

The variation of the results in the present study compared to other studies may be due to the geographic variation, as the Indian subcontinent is known for its enormous linguistic, cultural, ethnic, religious, and geographic heterogeneity. Segura-Wang and Barrantes reported that there is interpopulation variation in dermatoglyphic patterns. If OSMF can be predicted with the help of dermatoglyphic, then counselling and motivation of patients who are more prone to developing OSMF can be done at a much earlier stage. However, there is a need for more multicentric studies to be conducted in a larger population with age-, sex-, religion-, and race-matched controls, to segregate genetically predisposed individuals among the population at risk for developing OSMF[3].

Summary and Conclusion

The present study was undertaken to observe and compare the dermatoglyphic patterns in betel nut chewers with and without oral submucous fibrosis.

There was no correlation between habit index and dermatoglyphics as habit was variable in terms of duration and frequency, such as chewing for a longer duration and swallowing without spitting.

There was also no correlation between dermatoglyphics and the clinical staging of OSMF.

On digit wise comparison of the finger ridge patterns of both hands, the middle finger and ring finger of the right hand showed statistically significant p values. In the middle finger, subjects with a habit of chewing betel nut and having OSMF showed an increase in the number of simple whorl patterns (40%) as compared to subjects with a habit of chewing betel nut, without OSMF and subjects without any habit of chewing betel nut and not having OSMF, whereas subjects with a habit and not having OSMF showed an increase in radial loop patterns (80%) as compared to the other groups. In the ring finger, the percentage of simple whorls was maximum

in subjects with OSMF i.e. 72% as compared to groups 2 and 3 with 32% and 40% respectively; whereas the percentage of radial loops was maximum in group 2 i.e. 44% as compared to groups 1 and 3 with 20% and 36% respectively; also, there was a decrease in arch patterns in group 1 as compared to group 2.

Thus, with the help of these parameters, gutkha chewers likely to develop OSMF can be detected earlier, and the cost burden associated with genetic cytomarkers may also be prevented.

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