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Analysis of Dermatoglyphic Pattern in Potentially Malignant Disorder and Oral Carcinoma Patients

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Abstract

Aim: To assess the association between dermatoglyphic pattern and potentially malignant disorders and oral squamous cell carcinoma patients which might help in predicting the occurrence of these two disorders.

Background: Dermatoglyphics are the dermal ridge configuration on the digits, palms and soles. They are genetically determined and influenced by environmental forces that are operating before birth. Several studies have shown association between dermatoglyphics and different types of cancer. Hence this study was undertaken to determine whether specific dermatoglyphic patterns exists which help in predicting the occurrence of oral squamous cell carcinoma (OSCC) and oral potentially malignant disorders.

Materials and Method: After explaining about the study to the subjects, an informed consent will be obtained. A detailed history with thorough clinical examination will be done and findings will be recorded . The clinically diagnosed cases of potentially malignant disorders and oral squamous cell carcinoma will be confirmed histopathologically and will be included in the study. Finger and palm prints will be collected using ink method from 10 subjects with oral squamous cell carcinoma, 15 subjects with potentially malignant disorders and 25 healthy controls and will be evaluated qualitatively and quantitatively.

Results: Arches and loops were more frequent in cases than in controls whereas whorls were more frequent in control group. 80% of the patients with potentially malignant disorders have loop pattern, 40% of the patients has arches and 30% have whorls. 50% of the patients with oral squamous cell carcinoma have loop pattern, 30% have arch pattern and 20% have whorl pattern. 68% of the control group have whorl pattern, 20% have arch pattern and 12% have loop pattern.

Conclusion: This study concluded that dermatoglyphic patterns may have a role in identifying individuals either with or at risk for developing potentially malignant disorders like leukoplakia, oral submucous fibrosis , lichen planus etc and oral squamous cell carcinoma . Hence it can be used to identify high risk group, so that early primary and secondary preventive measures can be instituted in order to prevent the occurrence of these lesions.

Keywords: *Potentially malignant disorders, oral squamous cell carcinoma, dermatoglyphics, arches, loops, whorls.*

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Introduction

Since the early days of civilization, the features of the hands have fascinated scholars, doctors, and laymen alike. Through decades of scientific research, the hand has come to be recognized as a powerful tool in the diagnosis of psychological, medical, and genetic conditions. Cummins in 1926 first introduced the term “dermatoglyphics” which refers to the study of the

naturally occurring patterns of the surface of the hands and feet[1].Dermatoglyphics is a relatively new science, which involves the study of fine patterned dermal ridges on digits, palms and soles. Cummins and Midlo (1926) coined the term dermatoglyphics (derma = skin; glyphics = carvings), for the scientific study of ridges as well as the ridges themselves [2]. Since then, this approach has been used in various scientific studies to establish relationship of fingerprints as genetic and/or chronic health markers. Dermatoglyphic patterns are genetically determined and remain unchanged from birth to death. Dermatoglyphics is considered as a window of congenital and intrauterine abnormalities. At present, several researches claim this study of dermatoglyphics as an important diagnostic tool for some diseases especially the diseases with obscure etiology and mysterious pathogenesis [3]. Widespread interest in epidermal ridges developed only in the last several decades when it became apparent that many patients with chromosomal aberrations had unusual ridge formations. Unusual ridge configurations have been shown to exist not only in patients with chromosomal defects but also in patients with single gene disorders and in some in whom the genetic basis of the disorder is unclear [4]. In dentistry, dermatoglyphics have been studied to help predict disorders like cleft lip and cleft palate, dental caries, malocclusion, congenital anomalies like ectodermal dysplasia, gingival fibromatosis, periodontitis, bruxism etc [5]. Since epidermal ridge patterns form early in fetal development and remain unchanged throughout life [6,7] unusual dermatoglyphics may indicate gene or chromosomal abnormalities consistent with diseases such as oral leukoplakia, oral submucous fibrosis and oral squamous cell carcinoma. 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 [8].This study was undertaken to study dermatoglyphic patterns in individuals with potentially malignant disorders and oral squamous cell carcinoma, so that individuals with habits and similar patterns can be identified at the earliest and preventive measures can be instituted in these susceptible individuals to prevent the occurrence of potentially malignant disorders and oral squamous cell carcinoma.

Materials and method: After explaining about the study to the subjects, an informed consent will be obtained. A detailed history with thorough clinical examination will be done and findings will be recorded . The clinically diagnosed cases of potentially malignant disorders and oral squamous cell carcinoma will be confirmed histopathologically and will be included in the study. Finger and palm prints will be collected using ink method from 10 subjects with oral squamous cell carcinoma, 15 subjects with potentially malignant disorders and 25 healthy controls and will be evaluated qualitatively and quantitatively.

Fig 1: Patient with oral submucous fibrosis.

Fig 2: Patient with leukoplakia

Fig 3: Patient with lichen planus

Fig 4: Shows different dermatoglyphic pattern

Results

Arches and loops were more frequent in cases than in controls whereas whorls were more frequent in control group.

Table 1: Fingerprint pattern in patients with potentially malignant disorders

Pattern	Potentially Malignant Disorders
Arches	40%
Loops	80%
Whorls	30%

The above table shows distribution of various finger print patterns in patients with potentially malignant disorders. 80% of the patients with potentially malignant disorders have loop pattern, 40% of the patients has arches and 30% have whorls.

Table 2: Fingerprint pattern in patients with oral squamous cell carcinoma

Pattern	Oral Squamous Cell Carcinoma
Arches	30%
Loops	50%
Whorls	20%

The above table shows distribution of various finger print patterns in patients with oral squamous cell carcinoma.50% of the patients with oral squamous cell carcinoma have loop pattern, 30% have arch pattern and 20% have whorl pattern.

Table 3:Fingerprint pattern in control group

PATTERN	CONTROL GROUP
Arches	20%
Loops	12%
Whorls	68%

The above table shows distribution of various finger print patterns in control group.68% of the control group have whorl pattern, 20% have arch pattern and 12% have loop pattern.

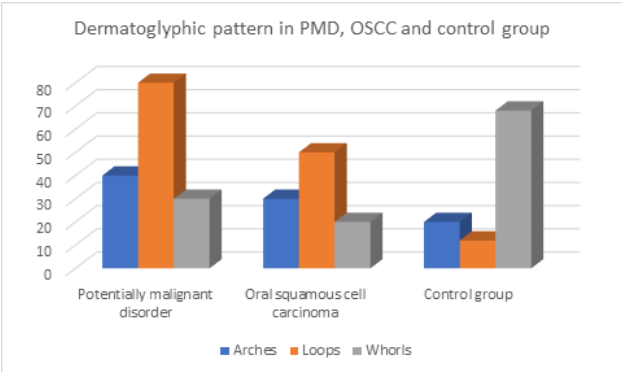

Fig 5: Graph showing different fingerprint pattern in potentially malignant disorder patients, oral squamous cell carcinoma patients and control group

Discussion

Dermatoglyphics refers to epidermal ridges present on the palm, sole, fingers, and toes. These epidermal ridges are formed in the same intrauterine period when neuronal development takes place in the intrauterine life of a fetus. Thus, dermatoglyphics is correlated with genetic abnormalities and is useful in the diagnosis of congenital malformations and many other medical disorders. Since then widespread interest in epidermal ridges developed in medical field since it became apparent that many patients with chromosomal aberrations had unusual ridge formations. Inspection of skin ridges, therefore seemed promising, simple, inexpensive means for determining whether a given patient had a particular chromosomal defect [9]. SCC is a widespread disease associated with considerable amount of morbidity and mortality. It is a major worldwide health problem and the number of sufferers is increasing rapidly due to more and more people embracing deleterious habits such as tobacco chewing, smoking and alcohol abuse. Similarly OSF is a widespread precancerous condition especially prevalent in South East Asia. Areca nut is an important predisposing factor, but not all the patients with chronic habits suffer from the disease. Conversely, not all the patients with OSF have a prolonged history of areca nut or tobacco consumption. It is said that genetic susceptibility is responsible for such variations.

Tobacco and alcohol are established risk factors for oral leukoplakia, oral submucous fibrosis and Oral squamous cell carcinoma, substantial evidence also suggest that the carcinogenic process is driven by the interaction between exposure to exogenous carcinogens and inherent genetic susceptibility. In response to environmental exposures, genetic damage accumulates more quickly in individuals with genetic susceptibility to DNA damage than in those without such instability but with a similar exposure. Consequently, individuals with genetic instability might be at a greater risk for developing these lesions [10].

In this study Arches and loops were more frequent in cases than in controls whereas whorls were more frequent in control group. Atasu et al, in examining dermatoglyphics and cancer patients in general, one of the studies has noted an increase in whorls and a decrease in radial loops in 201 Turkish cancer patients[8] which was contradictory to this study. Kindred et al, found that ,with different cancers found more whorls to be present and in studying high risk found more whorls[11]. Yet another study found an increased proportion of ulnar loops in cancer patients.

The dermal ridges have various notable characteristics which make them important, not only in personal identification, but also in human biology for various reasons. Firstly, unlike many bodily traits the dermal ridges and configuration once formed remain unchanged except in dimensions, i.e. they are age stable. The ridges are environment stable and begin to appear from 5th month of embryonic life. Although the patterns formed by ridges vary in size, shape and detailed structures, still they can be classified into definite main types. The dermatoglyphic features can thus be exploited quantitatively and qualitatively to be used as "genetic marker" of a disorder.

Considering the high mortality and high morbidity rate due to oral cancer in India, we planned to assess palmar dermatoglyphics in potentially malignant disorders and OSCC and find whether a correlation exists between potentially malignant disorders, oral squamous cell carcinoma and palmar dermatoglyphics. Our study revealed differences in the dermatoglyphic patterns among various groups which could be considered genetic markers for detecting those who are predisposed to develop potentially malignant disorders and oral squamous cell carcinoma.Hardly any dermatoglyphic study has been carried out in relation to oral malignancy, hence more studies with larger sample need to be undertaken to conclude the results.

Conclusion

Arches and loops were more frequent in cases than in controls whereas whorls were more frequent in control group.This study concluded that dermatoglyphic patterns may have a role in identifying individuals either with or at risk for developing potentially malignant disorders like leukoplakia, oral submucous fibrosis , lichen planus etc and oral squamous cell carcinoma . Hence it can be used to identify high risk group, so that early primary and secondary preventive measures can be instituted in order to prevent the occurrence of these lesions.

Ethical Clearance – Taken from Instituitional Ethical Committee

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Conflict of Interest- Nil

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