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Original Research

Assessment of Expression of Myofibroblast in Oral Squamous Cell Carcinoma Patients

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ABSTRACT:
Background: Oral squamous cell carcinoma (OSCC) is the sixth most common malignancy worldwide. Myofibroblasts exhibit a phenotype between fibroblasts and smooth muscle cells. Hence; under the light of above mentioned data, we planned the present study to assess the expression of myofibroblast in oral squamous cell carcinoma patients. **Materials & method:** A total of 20 normal healthy controls were included in the present study. Histopathologic sections of all the OSCC cases and normal healthy controls were obtained and were stained with H and E stain. We included those cases as normal healthy controls which were scheduled to undergo orthodontic dental extractions. Immuno-histochemical staining was done in all the 40 sections using alpha- Smooth muscle actin (α-SMA) antibody. Staining index for each group was calculated and compared. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. **Results:** Mean staining index score in the OSCC group and control group was found to be 8.41 and 0 respectively. Significant results were obtained while comparing the mean staining index score in between the OSCC group and the control group. **Conclusion:** Myofibroblast play a definitive role in the invasive behavior of OSCC.
Key words: Oral squamous cell carcinoma, Myofibroblast

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INTRODUCTION

Oral squamous cell carcinoma (OSCC) is the sixth most common malignancy worldwide. Transformation of normal oral mucosa (NOM) to SCC represents a complicated process involving numerous etiologic factors. Tumor stroma comprises of immunocompetent and inflammatory cells, endothelial cells, fibroblasts and a subtype specific of fibroblasts called myofibroblasts.[1-3] Myofibroblasts exhibit a phenotype between fibroblasts and smooth muscle cells. Myofibroblasts are derived mainly from fibroblasts and also from smooth-muscle cells, pericytes, macrophages, hepatic stellate cells, epithelium and bone marrow. The fact that stroma of the tumor modulates and facilitates the progression and metastasis of the malignancy has been shown in the past studies. The cells of the activated stroma that are responsible for the progression and metastasis of the tumor are the fibroblasts having smooth muscle properties. These myofibroblasts are said to secrete numerous inflammatory mediators and factors which are said to play a crucial role in tumor progression.[4-7] Hence; under the light of above mentioned data, we planned the present study to assess the expression of myofibroblast in oral squamous cell carcinoma patients.

MATERIALS & METHODS

The present study was planned with the aim of assessing the expression of myofibroblast in oral squamous cell carcinoma patients. A total of 20 patients with OSCC were included in the present study. A total of 20 normal healthy controls were included in the present study. Histopathologic sections of all the OSCC cases and normal healthy controls were obtained and were stained with H and E stain. We included those cases as normal healthy controls which were scheduled to undergo orthodontic dental extractions. Immuno-histochemical staining was done in all the 40 sections using alpha-Smooth muscle actin (α-SMA) antibody. Immunostaining was assessed by the evaluation of the staining intensity (SI) and percentage of α-SMA-positive cells, according to the method used by Etemad-Moghadam et al.[8] The scoring system included: 0% = no

positive cells, 1% = 1%–25% positive cells, 2% = 26%–50% positive cells, and 3% = 51%–100% positive cells. SI was evaluated as 0% = when there was no staining; 1% = in parts where positivity was observed only at a magnification of ×400; 2% = in cases where the staining was obvious at ×100, but not at ×40; and 3% = in fields where immunopositive cells were seen even at ×40. Multiplication of the percentage and intensity scores comprised the staining index (I) of each specimen. This index was classified as: zero = 0, low = 1, 2, moderate = 3, 4, and high = 6–9. Staining index for each group was calculated and compared. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

RESULTS

In the present study, a total of 20 OSCC cases and 20 healthy controls were analyzed. Percentage of myofibroblast score in the OSCC group and control group was found to be 2.95 and 0 respectively. Staining intensity score in the OSCC group and control group was found to be 2.90 and 0 respectively. Mean staining index score in the OSCC group and control group was found to be 8.41 and 0 respectively. Significant results were obtained while comparing the mean staining index score in between the OSCC group and the control group.

Table 1: Comparison of staining index score in between in oral squamous cell carcinoma group and normal control group

Group	Mean Staining index score	p- value
OSCC	8.41	0.000 (Significant)
Control	0.00	

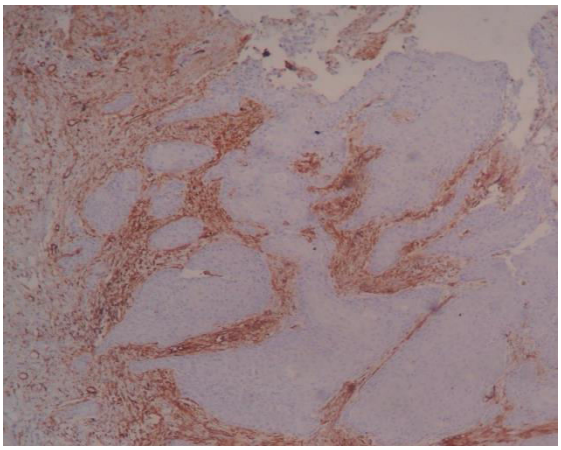

Figure 1: IHC Expression of myofibroblast in OSCC patient

DISCUSSION

In the oral cavity, oral squamous cell carcinoma (OSCC) is the most prevalent malignant neoplasm and has been reported to account for 70% to 90% of all oral malignant neoplasms. There is global variation in the incidence of OSCC with the Indian sub-continent presenting with particularly high incidence and prevalence, presumably, because of the predominant habits of chewing tobacco, betel quid and areca-nut. Tobacco use, in any form, and excessive alcohol use are the major risk factors for oral cancer. With dietary deficiencies, these factors cause more than 90 percent of oral cancers. Preventing tobacco and alcohol use and increasing the consumption of fruits and vegetables can potentially prevent the vast majority of oral cancers.[7- 9]

Myofibroblasts are large cells with ruffled membranes and highly active endoplasmic reticulum. Myofibroblasts are not part of normal cardiac tissue and appear only following cardiac injury. They are distinguishable from fibroblasts at the level of the EM by their high level of exocytotic vesicles and their stress fibers. At the level of the light microscope they can be distinguished by the presence of smooth muscle actin staining.[10]

In the present study, a total of 20 OSCC cases and 20 healthy controls were analyzed. Percentage of myofibroblast score in the OSCC group and control group was found to be 2.95 and 0 respectively. Staining intensity score in the OSCC group and control group was found to be 2.90 and 0 respectively. Gandhi P et al compared the presence of myofibroblasts in normal mucosa, different grades of OSMF, and oral squamous cell carcinoma (OSCC). The present in vitro cross-sectional descriptive study sample consisted of three groups, including 40 OSCCs, 40 OSMF, and 10 sections of normal oral epithelium taken as control group. Alpha-smooth muscle actin was used to identify myofibroblasts using immunohistochemical technique. $P < 0.05$ was taken as statistically significant. The presence of myofibroblasts was significantly higher in OSMF cases when compared with normal epithelium specimens. The presence of myofibroblasts was significantly higher in OSCC compared to OSMF cases. A significant difference was not observed between the different grades of OSCC. These findings favor the possibility that OSMF actually represents an abnormal healing process in response irritation caused by areca nut.[11]

In the present study, mean staining index score in the OSCC group and control group was found to be 8.41 and 0 respectively. Significant results were obtained while comparing the mean staining index score in between the OSCC group and the control group. Rao KB evaluated the presence of myofibroblasts in cases of Oral Submucous fibrosis (OSMF), which consisted of very early, early and moderately advanced OSMF, OSMF with dysplasia and oral squamous cell carcinoma (OSCC), by detecting (alpha)-SMA, which is a specific marker for myofibroblasts. The study sample consisted of three groups which comprised of 41 cases of OSMF, 10 cases of OSMF with dysplasia and 11 cases of OSCC. All the cases were subjected to immunohistochemistry by using (alpha)-SMA antibody for detection of myofibroblasts. The presence of myofibroblasts was significantly higher in oral squamous cell carcinomas as compared to that in OSMF with dysplasia and OSMF. A statistical significance was also noted between the staining index and age of the individuals and the staining index and duration of the habit. Myofibroblasts play a role in fibrosis, as was seen in OSMF.[12]

CONCLUSION

Under the light of above obtained data, the authors conclude that myofibroblast play a definitive role in the invasive behavior of OSCC.

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