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Assessment of Serum β2-Microglobulin Levels in Oral Cancer Patients: A Comparative Study

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ABSTRACT

Background: Major etiological and predisposing factors for Oral squamous cell carcinoma (OSCC) include mostly smoking and drinking habits, and ultraviolet radiation. Literature quotes paucity of data highlighting the status of serum β2-microglobulin in oral cancer patients. Hence; we planned the present study to assess the serum β2-microglobulin in oral cancer patients.

Materials & methods: The present study included evaluation of serum β2-microglobulin in oral cancer patients. A total of 20 oral cancer patients and 20 healthy subjects were included in the present study. Under septic conditions, 5 ml of blood was withdrawn from all the subjects, followed by separation of serum from it. Further assessment of serum β2-microglobulin levels was done with ELISA technique. All the results were summarized and analyzed by SPSS software.

Results: A total of 20 oral cancer patients and 20 healthy controls were included in the present study. Serum β2-microglobulin among control group and the oral cancer group were found to be 1.25 and 2.95 mg/L respectively.

Conclusion: Significant alterations in the levels of β2-Microglobulin definitely occur in oral cancer patients, which highlight its diagnostic role in the disease.

Keywords: β2-Microglobulin, oral cancer, Serum.

INTRODUCTION

Oral cancer accounts for 2%–4% of all cancer cases, worldwide. In some regions, the prevalence of oral cancer is higher, reaching the 10% of all cancers in Pakistan, and around 45% in India. In 2004-2009 over 300,000 new cases of oral and oropharyngeal cancer were diagnosed worldwide. During the same time period, over 7,000 affected individuals died of these cancers.[1-3]

Major etiological and predisposing factors for Oral squamous cell carcinoma (OSCC) include mostly smoking and drinking habits, and ultraviolet radiation (specifically for lip cancer), but several other factors such as human papillomavirus (HPV) and Candida infections, nutritional deficiencies and genetic predisposition have been also associated. OSCC is a disease of adults and elderly and its most common clinical presentation is an ulcerated lesion with necrotic central area surrounded by elevated rolled borders.[4, 5]

Although the main demographic and clinicopathological information on OSCC can be similar in most studies, it is accepted that some features can be quite variable from country to country and even from different regions in the same country.[6]

Among the uremic toxins in the "middle molecule" range, beta2-microglobulin (beta2-M) is certainly

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one of the most frequently studied compounds. Its serum level increases with the progression of chronic kidney disease, to reach very high concentrations in patients with end-stage kidney disease. It is the major protein component of dialysis-related amyloidosis, a dramatic complication which results from high extracellular concentration and posttranslational modification of beta2-M and a number of other promoters of amyloid fibril formation and deposition in osteo-articular tissues.[7]

Literature quotes paucity of data highlighting the status of serum β2-microglobulin in oral cancer patients. Hence; we planned the present study to assess the serum β2-microglobulin in oral cancer patients.

MATERIALS & METHODS

The present study was commenced in the department of oral pathology of dental institute and it included evaluation of serum β2-microglobulin in oral cancer patients. Ethical approval was obtained from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. A total of 20 oral cancer patients and 20 healthy subjects were included in the present study. Only those cases of oral cancer were included in the present study, in which histopathological confirmation was present. Under septic conditions, 5 ml of blood was withdrawn from all the subjects, followed by separation of serum from it. Further assessment of serum β2-microglobulin levels was done with ELISA technique. All the results were summarized and analyzed by SPSS software. Chi-square test was used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

A total of 20 oral cancer patients and 20 healthy controls were included in the present study. Mean age of the subjects of the oral cancer group and the control group was 52.1 and 49.3 years respectively. Out of 20 subjects of the oral cancer group, 14 were males while the remaining 6 were females. Similarly, out of 20 subjects of the control group, 15 were males while the remaining 5 were females. Serum β2-microglobulin among control group and the oral cancer group were found to be 1.25 and 2.95 mg/L respectively. Significant results were obtained while comparing the serum β2-microglobulin among control group and the oral cancer group.

Table 1: Demographic details of the subject of the present study group.

Parameter		Oral cancer group	Control group
Mean age (years)		52.1	49.3
Gender	Males	14	15
	Females	6	5
Total		20	20

Graph 1: Serum β2-microglobulin among control group and the oral cancer group.

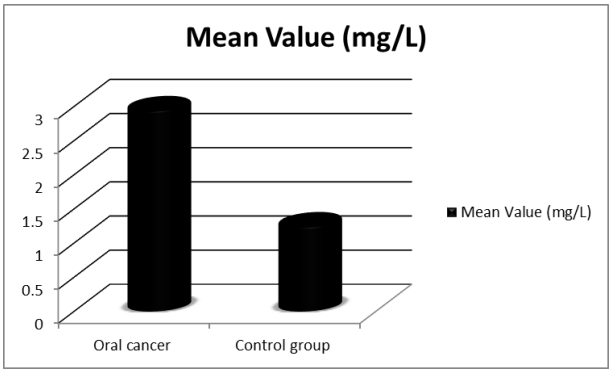

Table 2: Comparison of serum β2-microglobulin among control group and the oral cancer group.

Group	Mean Value (mg/L)	P- value
Oral cancer	2.95	0.02 (Significant)
Control group	1.25	

DISCUSSION

β2-Microglobulin is a low molecular weight, 11,600 Da protein found on the surface of all cells except erythrocytes. It was also shown to occur in small quantities in normal human urine, plasma and cerebrospinal fluid. This protein is the light or β-chain of the human leukocyte antigen (HLA). It exists in two main forms free and non-covalently linked to the HLA antigens, forming an invariant part of the HLA molecules. The serum β2-microglobulin is in the free form. It consists of a

single polypeptide chain with one intrachaindisulfide bridge. It does not contain carbohydrate. Increased β2-microglobulin levels have been reported in patients with oral cancer as well, but there are only limited studies to correlate the levels of serum β2-microglobulin with oral cancer and precancer.[10-12]In the present study, we observed that mean levels of serum β2-microglobulin among subjects of the oral cancer group were significantly higher in comparison to the subjects of control group. Our results were in correlation with the results of the past literature. Singh AP et al established the role of β2-m as a biochemical parameter for diagnosis and prognosis of oral carcinoma by estimation of serum β2-m levels in potentially malignant lesions, conditions, and oral squamous cell carcinoma. There study was carried out on 48 subjects (16 control, 8 oral submucous fibrosis, 8 oral leukoplakia, and 16 oral squamous cell carcinoma patients of different stages), There mean serum β2-m level in the control group was 1.173 ± 0.059, in potentially malignant lesions/conditions group was 1.688 ± 0.137 and in oral squamous cell carcinoma group was 2.835 ± 0.0313. This progressive increase in serum β2-m level was found to be highly statistically significant (P value < 0.001). Results of Receiver operating characteristic analysis showed β2-m as a 100% sensitive and specific biomarker for oral squamous cell carcinoma. Their study established β2-m as a specific biological tumor marke8r for diagnostic and prognostic evaluation of oral squamous cell carcinoma.[8]

Saddiwal R et al evaluated the prognostic value of β2-m as a biochemical parameter for the diagnosis and prognosis of oral squamous cell carcinoma (SCC).The study included 60 patients (15 oral SCC, 15 leukoplakia, 15 individuals exposed to various carcinogens and without oral cancerous or precancerous lesions, 15 healthy individuals. There results showed that β2-m was increased in individuals exposed to carcinogens without precancerous and cancerous lesion. Serum β2-m can be used as a better indicator and can give an early indication of malignant change and therefore malignancy can be detected at an early and treatable stage.[9]

Jiang Q et al investigated β2-microglobulin (β2-M) expression in normal oral mucosa and progressive oral squamous cell carcinoma (OSCC) and to assess the clinical significance of β2-microglobulin expression. The study included 10 cases of normal oral mucosa epithelium specimens, 55 cases of primary OSCC specimens, and 25 cases of OSCC metastasis specimens. Immunohistochemistry was used to determine β2-M expression, and its correlation with clinicopathological factors in progressive OSCC was evaluated. Immunohistochemistry showed that strong β2-M expression was significantly asscociated with tumor size (T3, T4 vs. T1, T2; P=0.001), positive node status (N positive vs. N negative; P=0.000) and advanced clinical stage (III, IV vs. I, II, P=0.000) in primary OSCC lesions. Compared to primary OSCC lesions, the frequency of β2-M expression was significantly increased in metastatic OSCC lesions (P=0.02). In addition, in vitro results from Western blotting showed increased β2-M expression in the two OSCC lines studied. Therefore, they speculated that the up-regulation of β2-M expression may contribute to the oncogenesis of human oral mucosa, tumor invasion and metastasis.[13]

CONCLUSION

Under the light of above results, the authors concluded thatsignificant alterations in the levels of β2-Microglobulin definitely occur in oral cancer patients, which highlights its diagnostic role in the disease. However; further studies are recommended.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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