SALIVARY COMPOSITION OF ORAL SQUAMOUS CELL CARCINOMA PATIENTS

Arbab Zia Ur Rehman[1], Mohammad Irshad[2], Sheraz Alam[3], Ismail Alam Khan[4], Kanwal Nazir Arbab[5], Aleena Amin [6]

ABSTRACT

OBJECTIVES

The purpose of the study was to determine the salivary composition of Oral squamous cell carcinoma patients.

METHODOLOGY

A retrospective study was conducted over 6 months on data of 60 Oral squamous cell carcinoma patients obtained from the patient records of the Institute of Radiotherapy and Nuclear Medicine, Peshawar. Salivary pH, Sodium, Potassium, and total proteins of Oral squamous cell carcinoma patients were recorded.

RESULTS

Sodium, Potassium, and total protein concentration in saliva of oral squamous cell carcinoma patients were 23.5 mM/L, 96.7mM/L, and 234.6 mM/L, respectively. These values were significantly higher than normal salivary concentration.

CONCLUSION

It was concluded that the saliva of oral squamous cell carcinoma patients contains higher concentrations of Sodium, Potassium, and total proteins.

KEYWORDS: *Oral Squamous Cell Carcinoma, Saliva, Sodium, Potassium, Proteins, Electrolytes*

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Correspondence
[6]Aleena Amin ,Lecturer Rehman College of Dentistry,Peshawar
: +92-335-5373359
: aleena.amin@gmail.com
[1] HOD, Rehman College of Dentistry, Peshawar
[2]Professor, Jouf University,KSA
[3]Associate Professor, Rehman College of Dentistry, Peshawar
[4]Assistant Professor, Rehman College of Dentistry, Peshawar
[5]Assistant Professor, Rehman College of Dentistry, Peshawar

INTRODUCTION

Saliva has multiple functions in the oral cavity Besides helping to digest the food, it also has important antimicrobial properties in fighting the microbes entering the oral cavity.[1] Saliva is composed of various proteins and minerals. Alterations in salivary composition can lead to difficulty in eating, speaking, and chewing and affect the quality of life.[2] Saliva contains biomarkers for certain diseases and is easy to obtain, unlike blood and tissue samples. Therefore, it has the potential of diagnostic importance for certain diseases.[3] Oral squamous cell carcinoma (OSCC) is a common malignancy of the oral region. In Pakistan, smoked and unsmoked tobacco and Pan (areca nut) are widespread, known causative agents for OSCC. These factors have contributed to the increase in the prevalence of OSCC in Pakistan.[4] The composition of saliva can change in different diseases, which is critical for the performance of its functions. Moreover, the salivary composition can also change due to the therapeutic radiations used to treat OSCC. Radiotherapy used for the treatment of OSCC can

also affect salivary glands and, as a result, causes xerostomia.[5] Studies have previously investigated saliva composition in OSCC and found an increase in the total protein content.[6] Other studies have noticed a decrease in the total protein content, and therefore, the results are inconclusive.[7] Not much work has been done in our part of the world on the altered salivary composition of OSCC patients. The results achieved from the current study will further help assess OSCC patients and act as a non-invasive tool for OSCC monitoring. The purpose of the current study was to determine the salivary composition of Oral squamous cell carcinoma patients.

METHODOLOGY

This retrospective study was conducted on records of 60 OSSC patients. Their data was retrieved from the Institute of Radiotherapy and Nuclear Medicine (IRNUM) patient database, Peshawar, after obtaining ethical approval from 1st January 2015 to 31st December 2020. Nonprobability consecutive sampling was done using G*Power software version 3.1.9.2 at a p-value of 0.05, medium power (0.3) and confidence interval of 95%. Patients of both genders with OSCC were included in this study. Patients with salivary gland pathology, history of chronic disease or systemic illnesses, history of drug therapy or being exposed to radiation were excluded from this study. After reviewing the database of the patient, the information which was recorded included age, sex, site of OSCC, OSCC grade, Salivary pH, salivary Sodium, Potassium, and total salivary content. Patients were classified clinically by the American joint Committee on the cancer staging system and histopathological by Border's criteria.[8] According to the laboratory database, saliva was collected 2 hours after the patient's usual breakfast to decrease variation in the composition of saliva. Patients rinsed their mouths with distilled water. Saliva was collected when the patients spit it into sterile plastic containers. 2-3 ml of saliva was collected. Lowry's method[9] was used to determine total salivary proteins. Sodium and potassium contents were determined using an atomic absorption spectrophotometer. Unstimulated saliva samples were collected in sterile tubes. These samples were transported to the lab on the same day. All the data retrieved was analysed by GraphPad Prism software (version 5.00 for Windows, San Diego, California, USA). All the values were expressed as mean ± SD.

RESULTS

The mean age of OSSC patients was 61 years, with 62% male and 38% female. The floor of the mouth was the usual location of OSSC, followed by the tongue, buccal mucosa, palate, alveolar ridge, and lips. Several patients were diagnosed with well-differentiated OSSC 51(85%), while 9(15%) were diagnosed with poorly differentiated OSSC. These results are given in Table 1.

Table 1: Age, Gender, Tumour Size and Grade.

Age		**Mean (± SD): 61(±17)**
Gender (N %)	Male	37 (62%)
	Female	23(38%)
Tumour Site	Buccal Mucosa	10(16%)
	Lip	5(8%)
	Tongue	14(24%)
	The Floor fóThe Mouth	17(28%)
	Alveolar Ridge	6(10%)
	Palate	8(14%)
Histological Grade	Well-Differentiated	51(85%)
	Poorly Differentiated	9(15%)

The mean saliva pH in the OSCC group was 6.3, with 4.9 to 7.4. Sodium, Potassium and total protein concentration in saliva of OSSC patients were 3.7 mM/L, 22.7 mM/L, and 234.6 mM/L, respectively. These results are given in Table 2.

Table 2: Salivary Composition of Patients (n=60)

Salivary content	Mean(±SD)	Range
pH	6.3 (± 1.1)	4.9 to 7.4
Sodium (mM/L)	3.7 (± 3.6)	2.1-6.7
Potassium (mM/L)	22.7 (± 13.4)	11.3-29.6

DISCUSSION

OSCC patients have a compromised oral environment, and their salivary composition can give some insight into the disease pathogenesis. Various salivary constituents in proper composition are necessary for functions such as remineralization, buffering of saliva, taste mediation, swallowing etc. Altered concentrations of these electrolytes compromise these functions[10]. There was a considerable increase in salivary proteins. This conflicts with some authors who have found total salivary proteins to be decreased due to the malnourished status of OSCC individuals.[11] The cause of increased salivary proteins in our study can be attributed to an increase in immunoglobulin G(IgG), indicating that IgG and other serum proteins are being leaked from the area affected by OSSC. This can be a result of a compromised, cancerous state. The same reason for the increase in salivary proteins has been found by several other authors.[12] At the same time, some

authors have found a total decrease in immunoglobulin A(IgA). OSSC patients have increased chances of oral infections due to decreased antibacterial salivary activity.[13] Increased levels of lactate dehydrogenase (LDH), insulin-like growth factor (IGF) and matrix metalloproteinases (MMP) in OSSC patients can also contribute to increased total salivary proteins. Several authors have studied OSCC patients and found that LDH levels increase due to increased exfoliation of epithelial cells.[14] Cancerous cells express growth factors and MMPs to degrade type IV collagen fibres in the basement membrane. Stromal cells at the border of OSSC express these enzymes, and elevate levels are diagnostic.[15] Various authors have found a concentration of sodium and potassium to be significantly higher.[16] We have similar results as we also found increased sodium and potassium levels in the OSCC group. Most of the patients in the OSCC group are old with compromised periodontal status. This increased level of sodium and potassium can be attributed to the increasing age and status of their periodontium. OSCC patients are mostly dehydrated due to difficulty in swallowing. Dehydration might have a role in an increased level of sodium and potassium ions. This fact has been validated by Bennet D at al.[17] The salivary analysis allows us to intervene, as timely conservative management of oral dysplasia can be done.[18] Analysis of saliva is a simple, friendly, and inexpensive method of screening for OSSC, and it also eliminates risks of contamination and infection. Further studies need to be done on other biomarkers that can help clinicians diagnose OSSC in the early stages of dysplasia. These will greatly increase treatment outcomes and make managing such patients very easy.

CONCLUSION

We conclude that the saliva of oral squamous cell carcinoma patients contains higher concentrations of Sodium, Potassium, and total proteins.

CONFLICT OF INTEREST: None

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CONTRIBUTORS
1. Arbab Zia Ur Rehman - Concept & Design; Critical Revision; Supervision; Final Approval
2. Mohammad Irshad - Data Analysis/Interpretation; Supervision
3. Sheraz Alam - Data Aquisition; Drafting Manuscript
4. Ismail Alam Khan - Data Aquisition
5. Kanwal Nazir Arbab - Data Analysis/Interpretation
6. Aleena Amin - Drafting Manuscript; Critical Revision