Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

Assessment of Serum and Salivary Lactate Dehydrogenase and Uric Acid Levels in Oral Squamous Cell Carcinoma Patient

Sujeev N[1], Shamil Mohamed[2], Thulasi P[3], Jothipriya B[4*], Amala P Mohan[5], R C Krishna Kumar[6]

[1]Associate Professor, PK Das Medical College, Vaniamkulam, Ottapalam, Kerala, India.
[2]Associate Professor, PK Das Medical College, Vaniamkulam, Ottapalam, Kerala, India.
[3]Assistant Professor PK Das Medical College, Vaniamkulam, Ottapalam, Kerala, India.
[*4]Assistant Professor, PK Das Medical College, Vaniamkulam, Ottapalam, Kerala, India.
[5]Senior Resident, PK Das Medical College, Vaniamkulam, Ottapalam, Kerala, India.
[6]Medical Director PK Das Institute of Medical Sciences, Vaniamkulam, Ottapalam, Kerala, India.

Corresponding Author: Dr Jothipriya B, Assistant Professor, PK Das Medical College, Vaniamkulam, Ottapalam, Kerala, India.
Email: joe9491@gmail.com

Received: 05 September 2022 **Revised:** 14 October 2022 **Accepted:** 26 October 2022

ABSTRACT

Background: To assess serum and salivary lactate dehydrogenase and uric acid levels in oral squamous cell carcinoma patients (OSCC).

Material and Methods: Seventy- five patients diagnosed with OSCC of either gender was put in group I and equal number of healthy controls without OSCC in group II. From all, 5 ml of venous blood samples was collected. LDH in serum and saliva was performed using a semi-automatic analyser machine. The serum and salivary uric acid levels were determined using the uricase–Trinder end point method.

Results: Group I comprised of 55 males and 20 females and group II had 40 males and 35 females. The mean salivary LDH level in group I was 640.3 U/L and in group II was 256.4 U/L. The difference was significant (P< 0.05). The mean serum LDH level in group I was 346.8 U/L and in group II was 250.0 U/L. The difference was significant (P< 0.05). The mean serum uric acid in group I was 6.92 mg/dl and in group II was 51.4 mg/dl. The difference was significant (P< 0.05). The mean salivary uric acid in group I was 5.96 and in group II was 5.20. The difference was significant (P< 0.05).

Conclusion: All patients diagnosed with oral squamous cell carcinoma exhibited increased level of serum and salivary LDH and uric acid.

Keywords: Oral squamous cell carcinoma, Salivary LDH, Uric acid.

INTRODUCTION

Oral squamous cell carcinoma (OSCC) is the sixth most common cancer worldwide. OSCC is highly prevalent in developing countries due to certain risk profiles and difficult accessibility of health services. Males have higher incidence and mortality rates than females. Excessive tobacco use and alcohol consumption are the main risk factors for about 90% of oral cancers. Delayed diagnosis is the main reason for high mortality rate of OSCC.[1]

The well-known laboratory parameters for survival time prediction in advanced cancer patients are leucocytosis, lymphocytopenia, and C reactive protein.[2] The prognostic role of lactate dehydrogenase (LDH) has been widely investigated in special cancer groups. Elevated LDH is consistently reported as a prognostic factor for poor survival in OSCC, lung cancer, pancreatic cancer, colorectal cancer, prostate cancer and haematologic malignancies. LDH

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

activity in serum increases as a marker of cellular necrosis.[3] LDH activity in saliva could constitute a specific indicator of oral mucosal lesions with tissue breakdown. The profile of salivary LDH isoenzymes is similar to that found in oral epithelium, indicating that the major source of salivary LDH is probably the oral epithelium-shedding cells. The similarity between the profile of LDH isoenzymes in whole saliva and the oral epithelium supports the hypothesis that salivary LDH is predominantly of extra glandular origin.[4] Consequently, LDH concentration in saliva, as an expression of cellular necrosis, could be a specific indicator for oral lesions that affect the integrity of the oral mucosa. Uric acid is produced as a result of purine metabolism, which is catalysed by the enzyme xanthine oxidoreductase.[5] The anti-oxidant effect of uric acid is evident in a multitude of disease conditions. This research assessed serum and salivary lactate dehydrogenase and uric acid levels in oral squamous cell carcinoma patients (OSCC).

MATERIAL & METHODS

We enrolled seventy- five patients diagnosed with OSCC of either gender. The permission for the study was sorted from ethical review committee of the institute. We obtained written consent from all subjects.

Patients with OSCC were put in group I and for comparison we included equal number of healthy controls without OSCC in group II. From all, 5 ml of venous blood samples was collected from the antecubital vein from all subjects in both groups, serum was then separated out and centrifuged at 2000 rpm for 10 min. For collection of saliva, all were made to sit comfortable with head upright and unstimulated saliva was collected in beaker. LDH in serum and saliva was performed using a semi-automatic analyser machine. The serum and salivary uric acid levels were determined using the uricase–Trinder end point method as uric acid (mg/dl) = (Absorbance of test/Absorbance of standard) x Concentration of the standard (mg/dl). The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

RESULTS

Table I Patients Distribution

Groups	Group I	Group II
Status	OSCC	Healthy
M:F	55:20	40:35

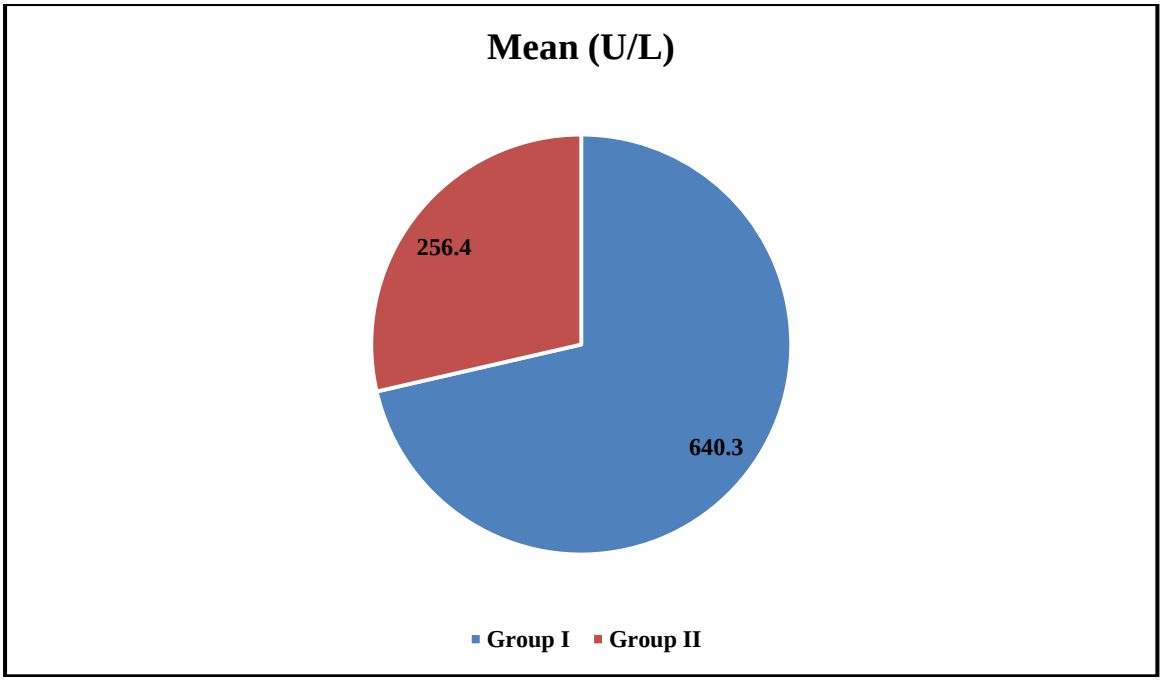
Group I comprised of 55 males and 20 females and group II had 40 males and 35 females (Table I).

Table II Comparison of salivary LDH level in both groups

Groups	Mean (U/L)	P value
Group I	640.3	0.001
Group II	256.4	

Table II, graph I shows that mean salivary LDH level in group I was 640.3 U/L and in group II was 256.4 U/L. The difference was significant (P< 0.05).

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

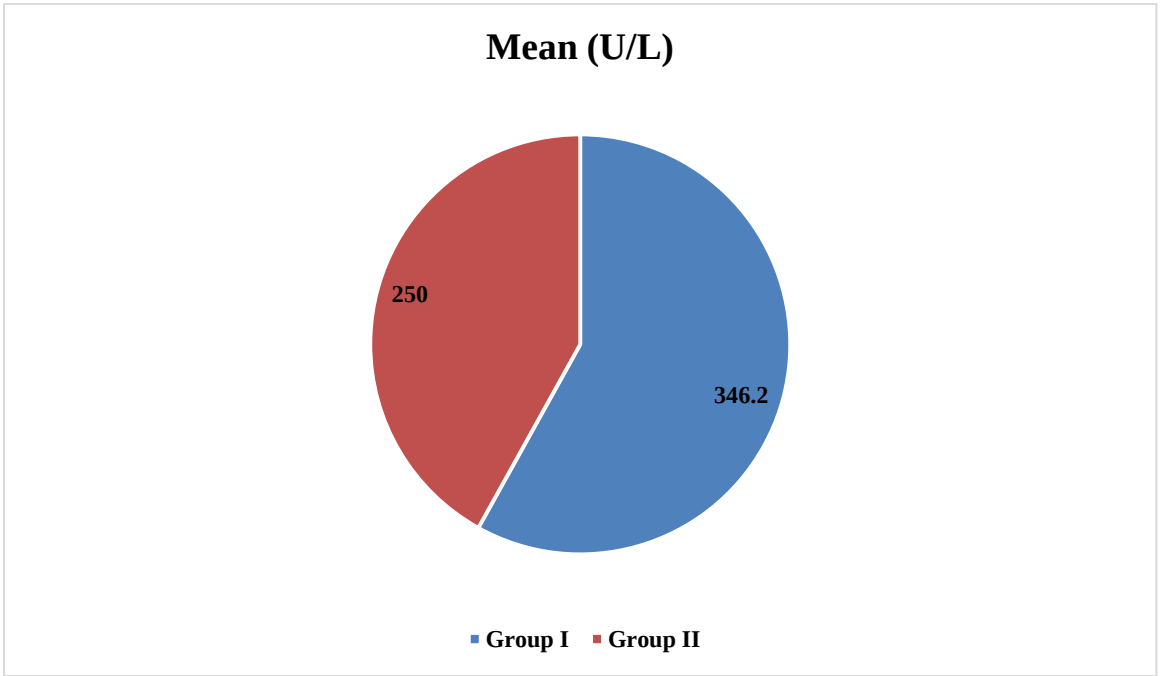


Graph I Comparison of salivary LDH level in both groups

Table III Comparison of serum LDH level in both groups

Groups	Mean (U/L)	P value
Group I	346.2	0.04
Group II	250.0	

Table III, graph II shows that mean serum LDH level in group I was 346.8 U/L and in group II was 250.0 U/L. The difference was significant (P< 0.05).



Graph II Comparison of serum LDH level in both groups

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

Table IV Comparison of serum uric acid in both groups

Groups	Mean	P value
Group I	6.92	0.01
Group II	51.4	0.17

Table IV shows that mean serum uric acid in group I was 6.92 mg/dl and in group II was 51.4 mg/dl. The difference was significant (P< 0.05).

Table V Comparison of salivary uric acid in both groups

Groups	Mean	P value
Group I	5.96	0.01
Group II	5.20	

Table V shows that mean salivary uric acid in group I was 5.96 and in group II was 5.20. The difference was significant (P< 0.05).

DISCUSSION

The source of salivary LDH in the oral cavity, according to some studies, may be attributed to the shedding of oral epithelial cells, which distinguish it from the LDH found in the bloodstream. Moreover, alterations in the LDH profile in salivary samples may be associated with pathological diseases such as OSCC.[6] Because of this, salivary LDH may be used to evaluate probable oral mucosal pathologies in a manner similar to other tissue pathologies, such as those in the heart, muscle, or liver, which can be examined using LDH detection in plasma. Lactate dehydrogenase is a hydrogen transfer enzyme that catalyses the oxidation of L-lactate to pyruvate with nicotinamide-adenine dinucleotide $(NAD)^+$ as hydrogen acceptor, the final step in the metabolic chain of anaerobic glycolysis.[7] Development of cancer is associated with a high glycolytic activity with a shift from aerobic to anaerobic glycolysis. With the increase in the glycolytic activity the concomitant increase in lactate dehydrogenase (LDH) enzyme may be reflected in certain tissues. Hyperuricemia is a condition in which there is an increased level of uric acid in the blood, which is defined as either >7.0 mg/dL or >6.0 mg/dL of serum uric acid concentration.[8] This research assessed serum and salivary lactate dehydrogenase and uric acid levels in oral squamous cell carcinoma patients (OSCC).

Our results showed that group I comprised of 55 males and 20 females and group II had 40 males and 35 females. Patel S et al[9] study comprised of three groups as follows: Group I: Comprised of 25 healthy individuals of comparable age. Group II: 25 otherwise healthy and consenting patients with oral leukoplakia (OL). Group III: 25 otherwise healthy and consenting oral squamous cell carcinoma (OSCC) patients. Inter comparison of salivary total LDH levels between all the three groups revealed that salivary LDH levels increase from healthy control group to oral leukoplakia group to further increase in OSCC group. On comparisons between the histopathological grades of OSCC group the level of LDH were found to increase from well differentiated to moderately differentiated to further increase in poorly differentiated patients.

The present salivary analysis for LDH enzyme reveals an overall altered salivary LDH enzyme level in OL and OSCC cases.

We observed that mean salivary LDH level in group I was 640.3 U/L and in group II was 256.4 U/L. Suh et al[10] evaluated lactate dehydrogenase (LDH) as a prognostic factor for survival time in terminal cancer patients. They prospectively followed 93 consecutive inpatients with terminal cancer. For 25 patients, LDH levels at 2 weeks and 1 week before death were compared. In multivariate analysis, elevated LDH level (P313 IU/L) was

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

confirmed as an unfavourable indicator for survival time. Serum LDH levels were significantly increased as the patients approached death. A combined index comprising LDH levels, C reactive protein levels, uric acid levels, presence of moderate to severe pain, fatigue, hypotension and performance status demonstrated a good stratification value for predicting survival time

Our results showed mean serum LDH level in group I was 346.8 U/L and in group II was 250.0 U/L. Gerogh et al[11] studied serum LDH isoenzymes in oral squamous cell carcinoma of oral cavity. They concluded that percentage distribution of serum LDH isoenzymes may represent useful parameter of disease activity in patients with OSCC.

Our results showed mean serum uric acid in group I was 6.92 mg/dl and in group II was 51.4 mg/dl. The mean salivary uric acid in group I was 5.96 and in group II was 5.20. Muralidhar et al[12] reported a definite rise of serum LDH levels from normal in premalignant and malignant cases. Anitha et al[13] compared and correlate LDH and uric acid levels in serum and salivary samples of OSCC patients and healthy individuals. LDH levels and uric acid levels were measured using an enzymatic method in serum and salivary samples of OSCC cases (n = 18) and healthy individuals (n = 18). This study indicated statistically significant elevated levels of LDH in serum and saliva samples of OSCC patients when compared to healthy individuals. Furthermore, serum and salivary uric acid were higher in OSCC patients than in controls.

CONCLUSION

All patients diagnosed with oral squamous cell carcinoma exhibited increased level of serum and salivary LDH and uric acid.

REFERENCES

1. Bryne M, Koppang HS, Lilleng R, Stene T, Bang G, Dabelsteen E. New malignancy grading is a better prognostic indicator than Broders' grading in oral squamous cell carcinomas. J Oral Pathol Med 1989;18:432-7. 1
2. Mager DL, Haffajee AD, Devlin PM, Norris CM, Posner MR, Goodson JM. The salivary microbiota as a diagnostic indicator of oral cancer: A descriptive, non-randomized study of cancer-free and oral squamous cell carcinoma subjects. J Transl Med 2005;3:27.
3. Reznick AZ, Hershkovich O, Nagler RM. Saliva: A pivotal player in the pathogenesis of oropharyngeal cancer. Br J Cancer 2004;91:111-8.
4. Li Y, St John MA, Zhou X, Kim Y, Sinha U, Jordan RC, et al. Salivary transcriptome diagnostics for oral cancer detection. Clin Cancer Res 2004;10:8442-50.
5. Chan FK, Moriwaki K, Rosa MJ. Detection of necrosis by release of lactate dehydrogenase activity. Methods Mol Biol 2013;979:65-70.
6. Rai B, Jain R, Anand SC, Kharb S. Salivary lactate dehydrogenase isoenzymes in oral lichen planus. Adv Med Dent Sci 2008;2:1-3.
7. Shetty SR, Chadha R, Babu S, Kumari S, Bhat S, Achalli S. Salivary lactate dehydrogenase levels in oral leukoplakia and oral squamous cell carcinoma: A biochemical and clinico-pathological study. J Cancer Res Ther 2012;8 (Suppl 1):123-5.
8. Joshi PS, Chougule M, Dudanakar M, Golgire S. Comparison between salivary and serum lactate dehydrogenase levels in patients with oral leukoplakia and oral squamous cell carcinoma — A pilot study. Int J Oral Maxillofac Pathol2012;3:7-13.
9. Patel S, Metgud R. Estimation of salivary lactate dehydrogenase in oral leukoplakia and oral squamous cell carcinoma: A biochemical study. J Can Res Ther 2015;11:119-23.

ISSN: 0975-3583, 0976-2833 VOL13, ISSUE 08, 2022

10. Suh SY, Ahn HY. Lactate dehydrogenase as a prognostic factor for survival time of terminally ill cancer patients: a preliminary study. European journal of cancer. 2007 Apr 1;43(6):1051-9.
11. Görögh T, Eickbohm JE, Ewers R, Lippert B. Lactate dehydrogenase isoenzymes in squamous cell carcinomas of the oral cavity. J Oral Pathol Med 1990;19:56-9.
12. Muralidhar M, Raghavan MR, Bailoor DN, Kamath VV. Evaluation of Serum Lactate dehydrogenase (LDH) in oral premalignant and malignant lesions. Ann Dent 1998;42:11-5.
13. Anitha G, Kumar KV, Deshpande G, Nagaraj M, Kalyani V. Utility of serum and salivary lactate dehydrogenase and uric acid levels as a diagnostic profile in oral squamous cell carcinoma patients. J Oral Maxillofac Pathol 2022;26:218-27.