



INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by Pharmascope Publications

Journal Home Page: www.pharmascope.org/ijrps

Serum LDH levels in oral squamous cell carcinoma patients

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Article History:

Received on: 15.03.2018
Revised on: 21.06.2018
Accepted on: 24.06.2018

Keywords:

OSCC,
LDH,
Malignancy marker,
Cell damage,
Carcinoma

ABSTRACT

Oral squamous cell carcinoma is one of the most common malignancy worldwide. It stands in the sixth position in the worldwide malignancies. It is the major cause of death in the world. This also accounts for many head and neck cancers. Theoretically, it should mostly be preventable and detectable at a very early stage. The factors that can increase the risk of OSCC include heavy alcohol use, usage of tobacco, including cigarettes, excessive sun exposure to the lips and even a weakened immune system. 30 OSCC patients and 30 healthy individuals from the OP of Saveetha Dental College. Serum samples were analyzed for the LDH status by using the kit method in autoanalyzer. There is a significant increase in Lipid dehydrogenase levels, i.e. ($p < 0.005$) levels present in OSCC patients when compared with healthy controls, by the influence of OSCC on LDH metabolism. Our findings suggest that assessment of LDH can be used as an effective biochemical diagnostic tool for the manifestation of OSCC and another type of malignancy in patients.



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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v9i3.1582>

Production and Hosted by

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INTRODUCTION

Oral Squamous Cell Carcinoma is one of the most common cancer worldwide. This is the leading cause of death in the world. It also causes various types of head and neck cancers. Theoretically, it must be more resistant and recognizable in the initial stage of cancer. The increased risk of OSCC risk factors includes heavy alcohol use, tobacco consumption, cigarettes, high sunlight and a weak immune system for the lips (Wood NK, Goaz PW *et al.*, 2006)

Lactate dehydrogenases are an enzyme found in cells of all organisms, including blood, muscles,

brain, kidney and pancreas. LDH is a specific enzyme, which is carried out during anaerobic glycolysis by pyruvate reduction of laurate product's catalyst catalysis. Lactate dehydrogenase in serum increases as cellular necrosis marker (Joshi PS, Chougule M *et al.*, 2012) Serum LDH levels in the diagnosis of various pre-cancer and cancers are used as an integrated biochemical marker. Cancer is the leading cause of mortality in adults in the entire world. Oral cancer is a severe problem in many countries. This causes considerable deaths and widespread failure, performance loss, behavioural changes, financial and social difficulties (Tomity I, Takács O *et al.*, 1979).

Test Lactate Dehydrogenase Examination of Violent Signs in Body Tissue Views. Increased LDH levels due to glycoprotein breakdown of lactic acid production through the mitotic index and cellular cells. LDH value increases in OSCC and effective malignant disorders (Giannoulaki EE, Kalpaxis DL *et al.*, 1989). Lactate dehydrogenase levels increase because of anaerobic glycolysis in oral squamous cell carcinoma (Liaw CC *et al.*, 1977) Early diagnosis and appropriate treatment prevents the progress of the condition of the disease and increases the survival rate. For that assessment, the LDH level will help assess the diagnosis of the disease

and assess the therapeutic choices of that condition (Hong SH *et al.*, 2010).

MATERIALS AND METHODS

Patients from Saveetha Dental College were selected from those attending the outpatient department, and divided into two different groups as below:

Group I – Normal healthy individuals – 30 individuals

Group II - Patients with OSCC – 30 individuals

Inclusion Criteria

Individuals with the age group of thirty-five to Sixty-five years

OSCC Patients

Exclusion Criteria

Individuals with other systemic illness like cardiovascular disease, Renal failure, Stroke, endocrine illness.

Immunocompromised individuals

Sample collection and Procedure

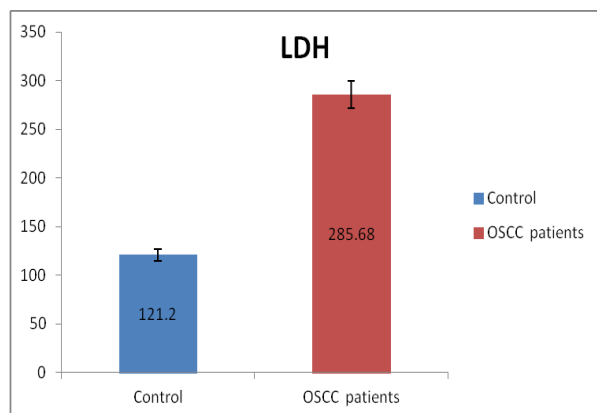
Informed consent was obtained from the patient before sample collection. 3ml of venous blood was collected and distributed in plain collection tubes and centrifuged in 3000rpm for 10 minutes. Then the serum was separated and then it is analyzed for serum Lactate Dehydrogenase (LDH) by Pyruvate Method using ERBA CHEM 5 plus analyzer.

RESULTS AND DISCUSSION

Table 1: Mean, SD and Significance value of LDH in two groups

Controls	OSCC patients	P-value
121.2 ± 17.73	285.68 ± 68.02	<0.005

Figure 1: Significance value of LDH in two groups



Oral squamous cell carcinoma is the most common disease/malignancy, and one of the major cause of cancer mortality in adults worldwide. About 500,000 new oral and pharyngeal cancers are being diagnosed per year, and about three-quarters

of these are mostly from the developing cities of the world. (Nagpal JK *et al.*, 2003). In India, mouth cancer is highly occurring, due to the habit of tobacco chewing, smoking beedis etc. (Saranath D *et al.*, 1993).

Radiological and histopathological investigations help in various Diagnosis of OSCC and oral pre-malignant lesions and conditions that are based on the findings obtained from the history, clinical examination and diagnostic aids. Considerations like the importance of early diagnosis, other factors such as prognosis of the lesion, response to therapy and new therapeutic modalities should also be given. Cancer is the most common disease in India responsible for maximum adult mortality with about 0.3-0.4 million deaths per year. It is ranked and the second common disease worldwide. (Imran Ali *et al.*, 2011). Mostly In India, the age-standardized incidence rate of oral cancer is about 12.6/100,000 population and there is a sharp increase in the incidence rate of this cancer that has been reported in these recent years (The main reason mainly goes to the usage of tobacco and consumption of low quality beediseven though 1.93% is not even related to tobacco (Prasanna Kumar Rao J *et al.*, 2012) and genetics mostly constitute about 5-10%. Potentially, these malignant lesions of the oral cavity commonly occur in about 2.5% of the population worldwide. (McCullough MJ *et al.*, 2010), with a diseased transformation rate in various paperwork & locations that range from about 0.6 to 20% (Neville BW *et al.*, 2009). Oral leukoplakia which is the most commonly occurring precancerous lesion of the oral cavity causes about 85% of such kind of lesions (Shklar G. *et al.*, 1966). Generally, as these cells progress from normal to the premalignant to the malignant condition, their chemical character may differ from normal. Malignant cells have a distinctive or specific type of metabolism. These cells mostly alter the biological and chemical parameters, which are either mostly increased or decreased. (Dabelsteen E *et al.*, 1967).

Blood acts as a unique and specialized medium, which shows various biochemical changes that occurs in the body due to this malignancy. The main idea of screening and following patients with malignancy by blood tests is appealing from several points of view including various factors like its simplicity, and it is ease, cheaper economic advantage, and possible repeated sampling. (Rajpura KB *et al.*, 2005).

Lactate dehydrogenase-5 (LDH-5) speeds up the reversible reaction of the transformation of pyruvate to lactate, holding a main position in the anaerobic cellular metabolism reaction. LDH-5 induction occurs mainly during hypoxia and transcription of LDH-5 is directly regulated with the help of

hypoxia-inducible factor 1 (HIF1). Serum LDH levels have been mainly correlated with a poor prognosis and chemotherapy resist ability and radiotherapy in various other diseases related to the neoplasm. There is a definite and a very consistent shift in the designated pattern of molecular forms of lactic dehydrogenase (LDH) that has been found in a very large series of human malignant neoplasms as when being compared to that of benign tumours and other normal controls. This has mainly been associated in various cases with an absolute and definite increase in the muscle-type LDH (which migrates negatively on electrophoresis). No other correlation was found between these degrees of the changes and most of the histologic grading of these tumours. No conclusive evidence was ever found for an absolute increase in LDH activity in these tumours. Metastatic nodules were shown to have been having a lower enzyme activity level and far more different LDH compositions when compared to that associated with primary tumours. (Robert D. Goldman *et al.*, 1967).

The early diagnosis of cancer is mostly based on the fact that this diseased transformation is a slow and a gradual process, and carcinomas only develop after a long period going through intermediate processes of various biological significances. The treatment to an early stage always offers the best prognosis and treatment plans and even a better chance of cure. (Schwartz MK *et al.*, 1973) Recently, some tumour markers are receiving more attraction and attention in early detection of these lesions. Various types of biological markers have been ushered and evolved in the platform of dentistry. Lactate dehydrogenase is a hydrogen transferring enzyme which is mainly involved in the final step of the metabolic chain of glycolysis of anaerobic respiration. LDH speeds up the oxidation and helps in the transformation from L-lactate to pyruvate with nicotinamide-adenine dinucleotide (NAD⁺) that acts as a hydrogen acceptor. This enzyme is mainly composed of four main peptide chains of two different types: M (Muscle) and H (Heart), each has a separate genetic control. LDH, which is a cytoplasmic enzyme which is mostly present in all major organ systems is essential. The appearance of LDH is extracellular and is mostly used to detect the damage or death of the cell. Thanks to its extraordinarily widespread distribution in the entire body, the serum LDH is not normal in a host of disorders. It is then released into the peripheral bloodstream after cell death caused by certain substances and factors, e.g. ischemia, excess heat or cold, starvation, dehydration, injury, exposure to bacterial toxins, and after ingestion of specific drugs, and from specific chemical poisonings (Drent M, Cobben NA *et al.*, 1996).

The LDH in all of the saliva within the oral cavity may or may not originate from various sources because the whole saliva is actually a combination of various secretions from both major and minor salivary glands, fluids, enzymes etc. diffused through the oral epithelium and gingiva, and also material that originates from the gastrointestinal reflux and cellular and various other debris. Nagler *et al.* concluded that the main and major source for whole saliva LDH is mostly non-glandular and that the oral epithelium is the major actual source (Drent M, Cobben NA *et al.*, 1996).

CONCLUSION

Serum LDH levels increase in oral premalignant lesion and conditions and OSCC. Serum LDH estimation can be proven, be a very valuable biochemical marker; as it is a very simple procedure and can be easily accepted by the patient.

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