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Study of Serum Alkaline Phosphatase in Different Histological Grades of Head and Neck Squamous Cell Carcinoma

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ABSTRACT

Cancer or Neoplasm is a disease in which abnormal cell divide uncontrollably and can be an abnormal mass of tissue, the growth of which exceeds and is uncoordinated with that of the normal tissues and persists in the same excessive manner after cessation of the stimuli which evoked the change. Recently many studies have suggested a prognostic role of serum alkaline phosphatase in carcinoma of head and neck. This study was conducted to find the levels of serum alkaline phosphtase in different histological grades of head and neck squamous cell carcinoma. It was a cross sectional study. A total of 85 clinically established patients, of local carcinoma of head and neck were taken for the study. Cases included all patients between age 18 to 70 years having locally squamous cell carcinoma of head and neck region and have not received any prior treatment for malignancy. There was a statistic significant increase in serum alkaline phosphtase level in poorly differentiated squamous cell carcinoma as compared to well differentiated squamous cell carcinoma.

Keywords: Squamous cell carcinoma, Serum Alkaline phosphatase, Neoplasm

INTRODUCTION

Cancer or Neoplasm can be defined as an abnormal mass of tissue, the growth of which exceeds and is uncoordinated with that of the normal tissues and persists in the same excessive manner after cessation of the stimuli which evoked the change(1). Cancers that are known collectively as head and neck cancers usually begin in the squamous cells that line the moist, mucosal surfaces inside the head and neck (for example, inside the mouth, the nose, and the throat). These squamous cell cancers are often referred to as squamous cell carcinomas of the

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head and neck.

Head and Neck Squamous Cell Carcinoma (HNSCC) is one of the commonest cancers in India. Of the 6,00000 new head and neck cancer cases diagnosed each year, 25% are from India. Head and Neck cancer is the sixth most common cancer worldwide. The head and neck cancers constitute 5%of all cancers worldwide and 15% of all cancers in developing countries.

Tobacco use is the cause of about 22% of cancer deaths(2). Another 10% are due to obesity, poor diet, lack of physical activity or excessive drinking of alcohol (3,4)

Assessment of tumor marker in serum, tissue and other body fluids during neoplastic process are of clinical value for a clinician in the management of patient with various body cancers. Identification of these tumor markers in blood would help in diagnosis of cancer at an early stage or in a precancerous stage. Alkaline Phosphatase aphosphate monoester hydrolase catalyzes the hydrolysis and transfer of phosphate groups in alkaline conditions . Alkaline phosphatase(ALP) is a hydrolase comprising six isoenzymes that catalyze the hydrolysis of phosphate esters in an alkaline environment, generating an organic radical and inorganic phosphate therefore elevation of ALP may indicate a heavy tumor burden. Elevated ALP levels have been shown to correlate with worse survival in hepatocellular carcinoma, gastric carcinoma, neuro- endocrine tumors, and metastasis in colorectal cancer.

Biochemical changes are commonly occurred in various malignancies specially in body fluid and tissues. Serum alkaline phosphatase activity is a useful indicator for detection of malignancies but its status in oral squamous cell carcinoma is less studied in this region.(4)

In literature very scanty studies on the role of serum alkaline phosphatase are available there for present study was conducted to evaluate diagnostic and prognostic approach of this parameter in head and neck squamous cell carcinoma subjects.

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MATERIALS AND METHODS:

The present study was conducted on 85 clinically established patients, of local carcinoma of head and neck attending O.P.D. and in I.P.D. in Department of Radiation Oncology, M.D.M. Hospital, Dr. S. N. Medical College. All the investigation work was performed in the clinical laboratory of Department of Biochemistry, Dr. S.N. Medical College Jodhpur using commercially available kits and autoanalyzers.Casesincludedallpatientsbetweenage18to70years having locally squamous cell carcinoma of head and neck region and have not received any prior treatment for malignancy. A sample was drawn from every patient for assessing the level of serum alkaline phosphatase. All were histologically proven cases of squamous cell carcinoma.

INCLUSION CRITERIA

All patients between age 18to70 years having locally advanced squamous cell carcinoma of head and neck region i.e. starting from base of skull to the thoracic inlet, and not received any prior treatment for malignancy and having normal baseline values for CBC (Hb, WBC count, platelet count, Absolute neutrophil count), RFT(urea, creatinine) and LFT.

EXCLUSION CRITERIA

Clinically diagnosed patient suffering from systemic conditions like: Cardiovascular disease (NYHA Classification)

- Anemia(WHO Criteria cut off value for Male 13gm/dl, Female 12gm/dl)
- Liver diseases(Altered LFT)
- Kidney diseases (Elevated RFT)
- Pancreatic diseases(Elevated Serum Amylase and Serum Lipase level)
- Acute inflammatory disease(Patients with increased WBC counts)
- HNSCC patients with cancer at other sites
- HNSCC patients with preoperative chemotherapy or radiotherapy
- Patients with evidence of secondary malignancies
- Pregnant (Diagnosed by USG) and lactating women will not be included.

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- Subjects who were not given consent.

The study was conducted after approval from the institutional ethics committee of Dr. S.N. Medical College, Jodhpur. An informed consent was taken from the subject before enrollment in study needed.

Complete history and general physical examination with an assessment of the patient's clinical status was done. Complete history of presenting complaints, habit of tobacco chewing or smoking was asked. Any significant past history or family history related to malignancy was recorded. General physical condition, nutritional status, anemia and oral hygiene were evaluated. Systemic examination of cardiovascular, respiratory, gastro- intestinal and nervous system were done. Local examination of oral cavity was done under aseptic conditions. Primary site of malignancy were inspected for site, size, shape, surface, borders, margins, base, infiltration to surrounding structures and any signs of inflammation. Serum alkaline phosphatase is measured by p-nitrophenyl phosphate (p-NPP) kinetic method(5).

Statistical analysis

The data assembled for serum alkaline phosphatase was subjected to suitable statistical analysis to compute central tendencies (mean) and accompanying measures of variability statistics (standard deviation) for all the groups. The magnitude of inter group differences was quantified by using student's compute't' test

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values (Student's 't' test). On the basis of t-values, 'p' values (probability) were determined to find out significance of variance between the mean values of groups of subjects studied.

RESULTS AND DISCUSSION

The present study was undertaken to look for serum alkaline phosphatase level in different grades of head and neck squamous cell carcinoma. Total 85 subjects attending the medical OPD and IPD were included in the study and then evaluated. Out of 85, 33 subjects are of well differentiated carcinoma, 28 are of moderately differentiated carcinoma and remaining 24 are of poorly differentiated carcinoma. Mean age of subjects in Group I (well differentiated carcinoma) was 49.18±11.16 years and mean age of subjects in Group II (moderately differentiated carcinoma) was 52.14±10.99 years mean age of subjects in Group III (poorly differentiated carcinoma) was 52.33±10.06years.Levels of serum alkaline phosphatase are higher in poorly differentiated carcinoma as compared to moderately and well differentiated carcinoma.

TABLE1: Serum Alkaline Phosphatase of various groups

Variables	Group I Mean±SD	Group II Mean±SD	Group III Mean±SD
Serum Alkaline phosphatase	143.54±33.14	299.60±67.24	544.79±159.13

TABLE2:Statistical significance of various group

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GROUPS	t-Value	p-Value	Statistical Significance
GROUPIVSGROUPII	6.488	<0.0001	HS
GROUPIVSGROUPIII	14.11	<0.0001	HS
GROUPIIVSGROUP III	9.545	<0.0001	HS

HS=HIGHLY SIGNIFICANT

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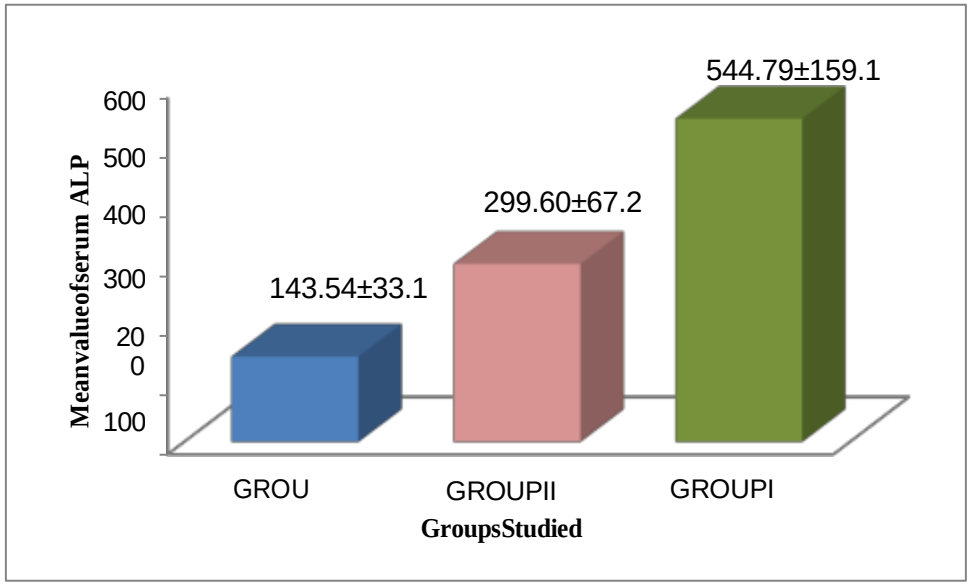

Figure-Mean serum alkaline phosphatase activity(IU/L) in different head and neck squamous cell carcinoma patients

DISCUSSION

Cancer is considered the second most common disease in India. The worldwide estimate for Head and Neck Cancer accounts for 2%–4% of all cancer cases(6). It was said that more than five people die from Head and Neck Cancer every hour each day in India(7).

The common sites of head and neck cancer are oralcavity, pharynx, larynx, nasal cavity, paranasal sinuses, soft tissues, neural structures and glands like salivary, thyroid and parathyroid.

There is substantial evidence that many environmental factors in the form of pollutants, smoking,

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and other carcinogenic agents alter cellular growth causing biochemical changes in blood which leads to accelerate the onset of HNSCC. In the Indian context, oral cancer etiology is dominated by tobacco use, especially because of smokeless tobacco, areca [betel] nut consumption and alcohol abuse. Alcohol consumption and tobacco use (including smokeless tobacco, sometimes called "chewing tobacco" or "snuff") are the two most important risk factors for head and neck cancers. The symptoms of head and neck cancers may include a lump or a sore that does not heal, a sore throat hat does not go away, difficulty in swallowing, and a change or hoarseness in the voice. Carcinogenesis leads to various biochemical changes in the body(8). The biological activity of OSCC is evaluated and descriptively categorized as highly, moderately and poorly differentiated. There are several advancements being made for the early detection of oral malignant and premalignant lesions. Biomarkers are being developed extensively to accurately diagnose the cancerous and precancerous conditions.

Biochemical parameter such as ALP evaluation is an inexpensive and potential marker for early detection of cancer that helps diagnosis(9). Alkaline phosphatase is present in all tissues throughout the body, but is particularly concentrated in the liver, bile duct, kidney, bone, intestinal mucosa and placenta. In the serum, two types of alkaline phosphatase isoenzymes predominate: skeletal and liver. Elevated levels of ALP are frequently observed in advanced cancers(8).

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Increased serum alkaline phosphatase (ALP) is recognized as an important marker of induction of tumor Cell differentiation. Most data indicate that the elevation of serum ALP occurs because of the accelerated denovo synthesis of the enzyme and subsequent regurgitation into the serum.(10)

In this study, levels of ALP are very high in poorly differentiated head and neck cancers as compared to highly differentiated head and neck cancers. ALP can acts as a good biomarker for early detection of head and neck carcinoma. Early detection of carcinoma helps in increase survival rate, improves life style and less mortality rate of cancer patients. Further studies with large sample size should be undertaken to validate the findings so that identification of tumor related variants early in the course of disease can be done and can be used for better management of these patients.

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