ORIGINAL RESEARCH

Serum alkaline phosphatase in oral and oropharyngeal cancer and its association with clinicopathological characteristics

[1]Dr.Tarun Kumar, [2]Dr. Ranjan Kumar

[1]Senior Resident, Department Of Biochemistry AIIMS, Patna, Bihar, India
[2]Associate Professor, Department of ENT, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Bihar, India

Corresponding Author
Dr. Ranjan Kumar
Associate Professor, Department of ENT, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Bihar, India

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ABSTRACT

Background: To assess the serum alkaline phosphatase in oral and oropharyngeal cancer and its association with clinicopathological characteristics. **Materials & methods:** A total of 100 subjects with confirmed diagnosis of oropharyngeal carcinoma were enrolled. Another set of 100 healthy controls were included. Diagnosis of oropharyngeal carcinoma was done on the basis of histopathological findings. Staging was done according to the Union for International Cancer Control classification. Evaluation of preoperative fasting blood ALP activity was done. 5 mL fasting venous blood was collected from antecubital vein of study and control group and ALP levels were measured using spectrophotometer. All the results were recorded and analysed using SPSS software. **Results:** Mean ALP levels among the patients of oropharyngeal carcinoma group and control group were 142.3 IU/L and 78.1 IU/L respectively. While comparing the results statistically, significant results were obtained. Mean ALP levels among males and females of the oropharyngeal carcinoma group were 141.8 IU/L and 143.7 IU/L respectively (p-value > 0.05). Mean ALP levels among patients of oropharyngeal carcinoma group with Tumour size T1 + T2 (<4cm) and tumour size T3 + T4 (> 4 cm) were 121.3 IU/L and 151.8 IU/L respectively (p-value < 0.05).Mean ALP levels among patients of oropharyngeal carcinoma group with early and advanced tumour stage were 123.8 IU/L and 149.6 IU/L respectively (p-value < 0.05). Mean ALP levels among patients of oropharyngeal carcinoma group with and without bone involvement were 146.2 IU/L and 131.7 IU/L respectively (p-value < 0.05). **Conclusion:** Alkaline phosphates could be considered a sensitive marker for the detection of cancerous lesions.

Key words: Oropharyngeal cancer, Alkaline phosphate

INTRODUCTION

Oropharyngeal squamous cell carcinoma (OPSCC), commonly known as throat cancer or tonsil cancer, refers to the cancer of the middle part of the pharynx, known as oropharynx, which extends vertically from the soft palate to the superior area of the hyoid bone and includes the base and posterior one-third of the tongue, the tonsils, soft palate, and posterior and lateral pharyngeal walls.[1]More than 90% of oropharyngeal cancers are squamous cell cancers, which is the cell lining of the oropharynx.[2, 3]

Alkaline phosphatase (ALP) is enriched in the kidney, bile duct, and liver and the elevation of ALP was also reported to be found in diverse malignancies and correlated to poor outcomes. Albumin-to-alkaline phosphatase ratio (AAPR) was firstly investigated to be a novel prognosticator in hepatocellular carcinoma in 2015 and a series of studies have shown the clinical significance of prognosis in several malignancies.[4-6]The enzyme ALP can physiologically dephosphorylate compounds under alkaline pH environment.9Serum ALP level is a widely used parameter for liver disease, bone disease burden, and treatment effects. It is acknowledged that the elevation in ALP level is positively related to the rise of bone activity like osteosarcoma.[5, 6]Hence; the present study was conducted for evaluating serum alkaline phosphatase in oral and oropharyngeal cancer and its association with clinicopathological characteristics.

MATERIALS & METHODS

The present study was conducted in the department of ENT and biochemistry with the aim of evaluating serum alkaline phosphatase in oral and oropharyngeal cancer and its association with clinicopathological characteristics. A total of 100 subjects with confirmed diagnosis of oropharyngeal carcinoma were enrolled. Another set of 100 healthy controls were included. Diagnosis of oropharyngeal carcinoma was done on the basis of histopathological findings. Staging was done according to the Union for International Cancer Control classification. Evaluation of preoperative fasting blood ALP activity was done. 5 mL fasting venous blood was collected from antecubital vein of study and control group and ALP levels were measured using spectrophotometer. All the results were recorded and analysed using SPSS software.

RESULTS

Mean age of the subjects of the oropharyngeal carcinoma group and control group was 45.3 years and 47.1 years respectively. Mean ALP levels among the patients of oropharyngeal carcinoma group and control group were 142.3 IU/L and 78.1 IU/L respectively. While comparing the results statistically, significant results were obtained. Mean ALP levels among males and females of the oropharyngeal carcinoma group were 141.8 IU/L and 143.7 IU/L respectively (p-value > 0.05). Mean ALP levels among patients of oropharyngeal carcinoma group with Tumour size T1 + T2 (<4cm) and tumour size T3 + T4 (> 4 cm) were 121.3 IU/L and 151.8 IU/L respectively (p-value < 0.05).Mean ALP levels among patients of oropharyngeal carcinoma group with early and advanced tumour stage were 123.8 IU/L and 149.6 IU/L respectively (p-value < 0.05). Mean ALP levels among patients of oropharyngeal carcinoma group with and without bone involvement were 146.2 IU/L and 131.7 IU/L respectively (p-value < 0.05).

Table 1: Comparison of ALP levels among study group and control group

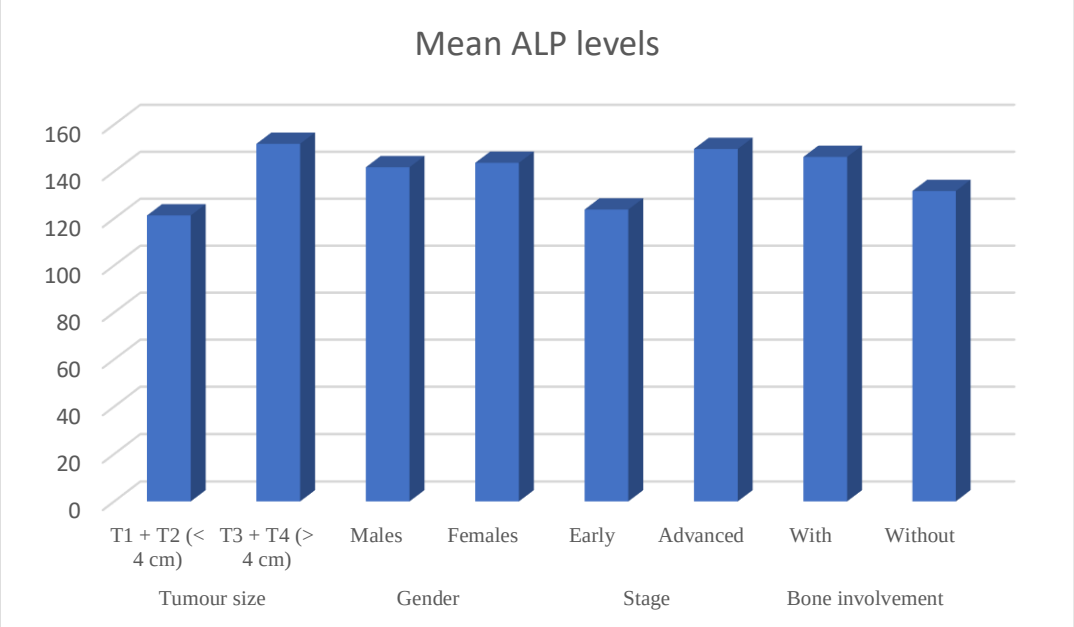
ALP levels (IU/L)	Oropharyngeal carcinoma group	Control group
Mean	142.3	78.1
SD	23.7	12.6
p-value	0.000 (Significant)	

Table 2: Clinico-pathological assessment of ALP levels among patients of study group

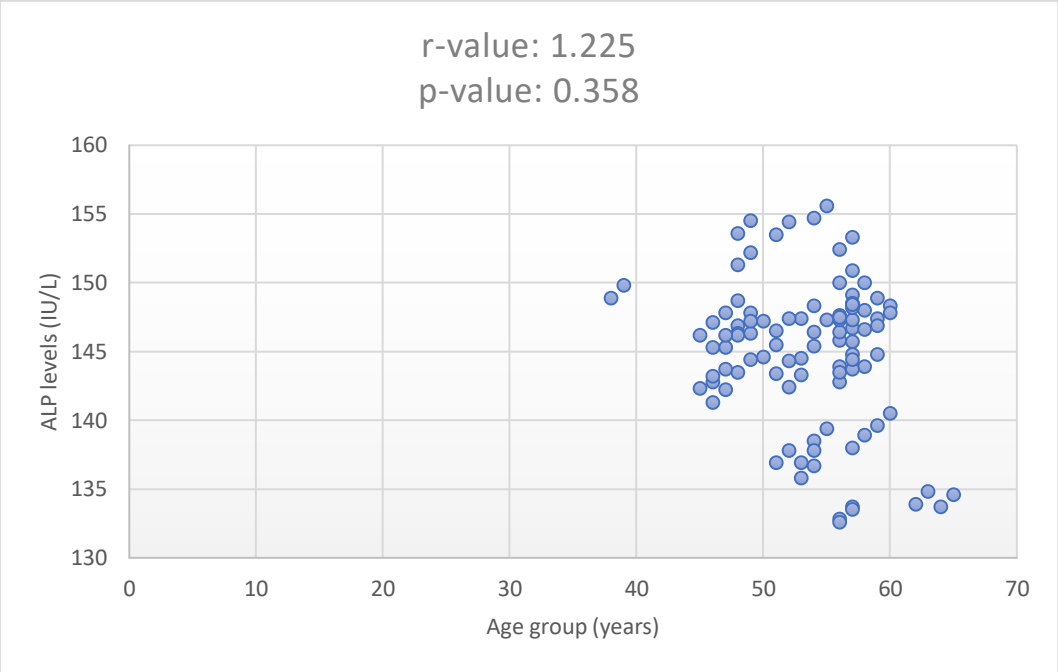
Oropharyngeal carcinoma patients		Mean ALP levels	p-value
Tumour size	T1 + T2 (< 4 cm)	121.3	0.000*
	T3 + T4 (> 4 cm)	151.8	
Gender	Males	141.8	0.775
	Females	143.7	
Stage	Early	123.8	0.001*
	Advanced	149.6	
Bone involvement	With	146.2	0.000*
	Without	131.7	

*: Significant

Graph 1: Clinico-pathological assessment of ALP levels among patients of study group



Graph 2: Correlation of ALP levels with age among oropharyngeal carcinoma group patients



DISCUSSION

Oral and oropharyngeal cancers (O-OPCs) group represents the sixth most common cancer with around 500,000 cases worldwide. There is an alarming increasing incidence of O-OPCs in younger patients particularly in the Middle East (14.5%) and Africa (17.2%). A major variation in the epidemiology of O-OPCs was observed based on geographical distribution, sex and age worldwide. Numerous risk factors have been implicated in the etiology of O-OPCs including tobacco use, alcohol consumption, human papillomavirus (HPV) infection, poor oral hygiene, low socioeconomic status and genetic factors, and factors such as ethnic groups, lifestyle, occupational exposure, immune deficits, familial risk and lack of fruits/vegetable regular eating.[7-9]

Alkaline phosphatase (ALP) comprises a group of enzymes that catalyze the hydrolysis of phosphate esters in an alkaline environment, generating an organic radical and inorganic phosphate.1 Like other enzymes, this enzyme has many isoenzymes. In healthy adults, this enzyme is mainly derived from the liver, bones, and in lesser amounts from intestines, placenta, kidneys, and leukocytes.2 An increase in serum ALP levels is frequently associated with a variety of diseases, such as extrahepatic bile obstruction, intrahepatic cholestasis, infiltrative liver disease, and hepatitis. In general, the elevation of ALP less than three times the normal level is considered nonspecific and insufficient to provide a definite diagnosis.[10, 11]

Mean age of the subjects of the oropharyngeal carcinoma group and control group was 45.3 years and 47.1 years respectively. Mean ALP levels among the patients of oropharyngeal carcinoma group and control group were 142.3 IU/L and 78.1 IU/L respectively. While comparing the results statistically, significant results were obtained. Mean ALP levels among males and females of the oropharyngeal carcinoma group were 141.8 IU/L and 143.7 IU/L respectively (p-value > 0.05). Our results were in concordance with the results obtained by previous authors who also reported similar findings. In a study conducted by Acharya, S et al, authors evaluated the serum level of ALP in OSCC patients and assess its relation with the clinicopathological features.A total of 175 participants (145 OSCC patients and 30 healthy controls) were included in the study. Raised ALP was seen in 24% of OSCC patients. The mean ALP in OSCC was significantly higher than the control. ALP level in patients with advanced stage was significantly higher than with early stage. The serum ALP level in OSCC patients with bone involvement (BI) by local extension of tumor was significantly higher than without BI.ALP showed statistically significant differences in relation to tumor stages and BI.[12]

In the present study, Mean ALP levels among patients of oropharyngeal carcinoma group with Tumour size T1 + T2 (<4cm) and tumour size T3 + T4 (> 4 cm) were 121.3 IU/L and 151.8 IU/L respectively (p-value < 0.05).Mean ALP levels among patients of oropharyngeal carcinoma group with early and advanced tumour stage were 123.8 IU/L and 149.6 IU/L respectively (p-value < 0.05). Mean ALP levels among patients of oropharyngeal carcinoma group with and without bone involvement were 146.2 IU/L and 131.7 IU/L respectively (p-value < 0.05). In another similar study conducted by Menaka TR et al, authors compared the levels of S-ALP among tobacco users, nonusers and in individuals with OPMD.The study population comprised 42 individuals,

categorized into four groups with/without tobacco usage habit and with/without lesion. 5 ml of unstimulated saliva sample was collected, centrifuged at 3000 rpm for 15 min and supernatant separated. S-ALP was estimated in the supernatant by using kinetic photometric method in an automatic analyzer.The mean S-ALP was 18.00 IU/L for normal individuals without tobacco usage, 4.60 IU/L for smokers without lesion, 7.50 IU/L for tobacco chewers without any lesion and 64.90 IU/L for individuals with OPMD. The mean difference between the groups was statistically significant ($P < 0.001$) using Kruskal–Wallis' ANOVA. They concluded that S-ALP could be used as a reliable noninvasive biomarker in monitoring OPMD.[13]

CONCLUSION

Alkaline phosphates could be considered a sensitive marker for the detection of cancerous lesions.

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