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Estimation of L-Fucose and Sialic Acid as Prognostic Markers in Precancerous Condition in Mangalore Population.

Roopesh J Poojary[1], Suchetha Kumari[2], Nayanatara AK[3], Rashmi Kaup Shiva[3]*, Vinodini NA[3], and Dharnappa Poojary[4].

[1]Junior research Fellow, Department of Physiology, KMC Mangalore, (A unit of Manipal University), India.
[2]Department of Biochemestry, KS Hegde Medical College, Deralakatte, Mangalore,India.
[3]Departments of Physiology, Center for Basic Sciences, Kasturba Medical College, Bejai, Mangalore, Manipal University, Karnataka, India.
[4]Associate Professor, Department of Oral And Maxillofacial Surgery, Manipal College of Dental sciences, Mangalore, Manipal University, Karnataka, India.

ABSTRACT

Oral pre cancer is a lesion found in the oral cavity and oropharynx. Sialic acid (N-acetyl neuraminic acid) and L-fucose (6 deoxy-L galactose) are the monosacharides present in the mammalian cells. Literature review has showed a clear link between these monosaccharides and various carcinomas. Objectives of the present study is to estimate and compare the status of Sialic acid and L-fucose in precancerous patients. Present study is conducted in compliance with the ethical committee guidelines of the institute. Sixty subjects with the age range 20-60 years were included in the current study. The study group included clinically diagnosed cases of oral sub mucous fibrosis, leukoplakia and erythroplakia. These were clinically confirmed cases of oral pre-cancer. L-fucose and sialic acid were measured by Winzlers method in serum sample. The levels of Sialic acid and L-fucose were found to be increased significantly increased in various stages of pre cancer in comparison with the normal subjects (p >0.001).When pre-cancer develops, cell to cell adhesiveness is diminished among these cells and they easily enter into the blood stream. The level of serum Sialic acid and L-Fucose increases along with the severity and inflammation of the tissues.

Keywords: oral pre cancer, sialic acid, L-Fucose, leukoplakia, erythroplakia

*Corresponding author

INTRODUCTION

Oral pre cancer is a lesion found in the oral cavity and oropharynx. Sialic acid (N-acetyl neuraminic acid) and L-fucose (6 deoxy-L galactose) are the monosacharides present in the mammalian cells. Literature review has showed a clear link between these monosaccharides and various carcinomas. Objectives of the present study is to estimate and compare the status of Sialic acid and L-fucose in precancerous patients. Present study is conducted in compliance with the ethical committee guidelines of the institute. Sixty subjects with the age range 20-60 years were included in the current study. The study group included clinically diagnosed cases of oral sub mucous fibrosis, leukoplakia and erythroplakia. These were clinically confirmed cases of oral pre-cancer. L-fucose and sialic acid were measured by Winzlers method in serum sample. The levels of Sialic acid and L-fucose were found to be increased significantly increased in various stages of pre cancer in comparison with the normal subjects (p >0.001).When pre-cancer develops, cell to cell adhesiveness is diminished among these cells and they easily enter into the blood stream. The level of serum Sialic acid and L-Fucose increases along with the severity and inflammation of the tissues.

Incidences of oral cancer is highest in India which contributes 30% of all types of cancers [1]. Increasing incidence of cancer in the recent years necessitates in depth probing of various etiological and contributory factors for its early diagnosis and prognosis. The progression of cancer is a multistep process which arises from pre-existing possibly malignant lesions [2]. Early detection of oral cancer is the utmost effective way to improve survival sub mucous fibrosis, Leukoplakia and Erythroplakia are precursors to cancer [3, 4]. These benign disorders can occur anywhere in mouth. Only a biopsy report can determine whether precancerous cells or cancer cells are present [4].The treatment strategy for this cancer is mainly based on the tumour, node and classification of metastasis and histopathological diagnosis [5]. These methods often fail to identify the disease in early stages [5]. Furthermore, these methods do not reflect the aggressiveness of tumours and progress made by the patient to therapy. Besides, other approaches like serum and saliva analysis may provide a cost effective method for screening as well as post therapeutic monitoring [5].Despite rapid advances in multimodality therapy, mortality rates of this devastating ailment have not improved in decades [6, 7]. There is need to develop sensitive, specific and faster tests as an aid in the early diagnosis of the primary tumor and its recurrence or malignant transformation in premalignant states.

Presence of cancer is indicated by the significant amounts of tumor marker produced by the tumor. Tumor markers may be present as intracellular substances in tissues or may be released into blood stream and present in serum. Ongoing search for appropriate tumor markers in serum, tissue and body fluids during neoplasm is of clinical importance in managing patients of different cancerous conditions [8, 9]. Sialic acid is a monosaccharide with nine carbon back bone. Sialic acid is important components in defining the surface properties of cell [10]. It has been associated in cellular invasiveness, adhesiveness, and immunogenicity [10]. Increased turnover, secretion and shedding from malignant cells result in increased glycoproteins in the circulation. Fucose is a monosaccharide that is a common component of many N and O-linked glycans and glycolipids produced by mammalian cells. Fucosylation of glycoproteins is one of the vital features that mediate specific biologic functions [11]. It was reported that tumour cells modify their surface by increasing fucosylation levels to escape recognition [12]. This in turn add to various anomalous features of tumors, such as reduced adhesion and uninhibited tumour growth. It has already been reported that changes of serum sialic acidand fucose levels in cancer patients relate well with decrease in tumour mass and relapse and metastasis of the disease [13]. This has been considered as a valued tumour marker in observing the clinical status of the carcinoma patients [13].The current study was aimed to estimate and compare L-Fucose and Sialic acid level in normal and pre- cancer patients

MATERIAL AND METHODS

Oral precancerous lesions patients visited to the department of oral medicine and radiology in Mangalore hospitals were selected for the study. The selection of the subjects for the study was done, based on the case history and clinical examination. Similarly, age and sex matched healthy volunteers without tobacco related oral habits or oral lesions were included in the control group.

Method of collecting blood sample: After obtaining an informed consent five ml of peripheral blood sample was collected from each subject with disposable syringes under aseptic conditions through venipuncture. Blood was collected and serum was separated by centrifugation at 3000rpm for 15 minutes. The samples

collected were stored at -80°C.Then these samples were used for the analysis of Sialic acid and L-Fucose by Winzler's method [14].

Statistical analysis: Data were presented as mean ± SEM**.** Student t test was applied to paired data of independent observations made in two separate groups. The various analyses were performed using SPSS version.20.0. $p < 0.05$ was considered significant.
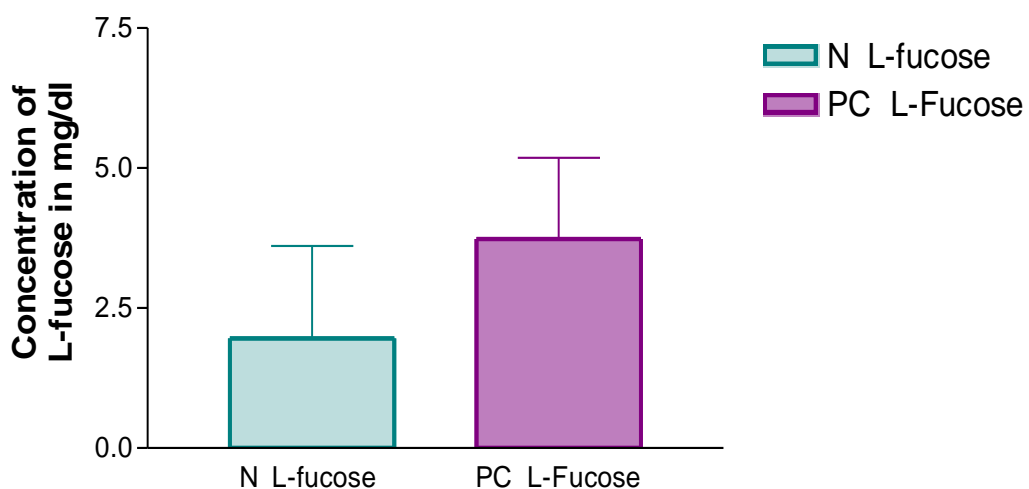
RESULTS

The serum level of sialic acid and L-Fucose were elevated significantly ($p < 0.001$) in pre-cancer conditions in comparison with the controls.

Serum Sialic acid Level in Normal and Precancer
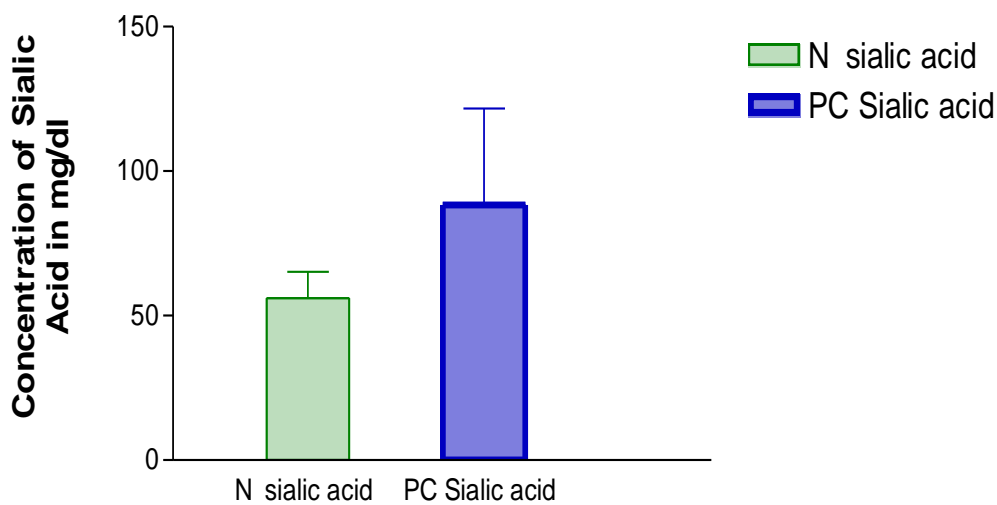
Serum L-Fucose level in Normal and Precancer

DISCUSSION

Tumor markers are a major part of the secondary prevention efforts [7]. Aberrant glycosylation is the collective feature of any type of cancer. Glycoproteins and glycolipids makes up major components of cell membrane [7]. Increased level of different components of glycoproteins has been associated with different

types of malignancies [15]. In the current study sialic acid and L-fucose levels were significantly elevated in pre-cancerous conditions in comparison with the normal controls. Severity of precancerous condition increases as duration of exposer of carcinogens increases and turns into cancer. This directly cause to release glycocongugates into the blood stream by losing the cell-cell contacts, by which tumor becomes larger and invade into circulatory system. Our findings are in agreement with the previous findings [16].

Increased serum sialic acid and L-fucose in oral pre-cancer conditions indicates its importance as a biomarker and may have a potential for using for early diagnosis. Further research is recommended to re-confirm our findings with more samples and better techniques available for the estimation of the sialic acid and L-fucose.

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