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Evaluation of Fasting blood sugar levels in oral cancer, potentially malignant disorders and in patients with tobacco habit—a case control study.

Biochemistry

KEYWORDS: Oral cancer(OC), potentially malignant disorders(PMD), fasting blood sugars(FBS), Habit.

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ABSTRACT

Background: Oral cancer is one of the most common causes of death is cancer. The most common risk factor for oral cancer is tobacco. Usage of tobacco leads to changes in the oral mucosa in the form of potentially malignant disorders which further causes oral cancer. However Recent epidemiological studies have shown a strong link between diabetes and cancer. .Hence this study was aimed to evaluate SG levels in patients with oral cancer (OC), potentially malignant disorders (PMD) and in patients with tobacco habit. **Materials and Method:** This case control study consisted of 80 subjects which were divided into mainly two groups; study and control groups. The study group consisted of a total of 60 patients, 20 patients in each subgroups ie, OC, PMD, patients with tobacco habits. Control group consisted of 20 healthy individuals without lesions or tobacco habits. Fasting serum samples were subjected for biochemical evaluation using BS-380 chemist autoanalyser and the results are analyzed. The values obtained were statistically analyzed using SPSS 19.0 version software. **Result:** There was significant increase of FBS levels in oral cancer and precancer (P<0.001). There as no change of SG in habit patients. **Conclusion:** There is an increased glucose levels in PMD and OC. The increased SG levels may be considered as a useful indicator for initial changes occurring in the neoplastic cells.

Introduction:

Oral cancer is one of the most common causes of death is cancer.[1] More than 11 million people are diagnosed with cancer every year. It is estimated that there will be 16 million new cases every year by 2020.[2] Most of oral cancers occur as squamous cell carcinomas. Most affected patients are middle-aged or elderly individuals. In male, OC represents 4% of total body cancer; in females, 2% of all cancers. Many oral squamous cell carcinoma (OSCC) develops from potentially malignant disorders (PMD) of the oral cavity. The use of tobacco has been well established as a significant risk for the development of OSCC and PMDs like leukoplakia, erythroplakia and oral submucous fibrosis. OC is found to be associated with tobacco usage in one or the other form. The risk of developing malignancy is 5-9 times greater for smokers than non-smokers which is dose dependent.[3]

However the recent epidemiological studies have shown a strong link between diabetes and cancer.[4] The diabetes and cancer has many common risk factors such as obesity, male sex and ageing, both are associated with more incidence of cancer.[5] The first association between cancer and diabetes was studied in 1885.[6] Diabetes mellitus causes many immunologic and metabolic changes in the oral mucosa.

More over the early detection of cancer is of critical importance because survival rates markedly improve when the oral lesion is identified at an early stage. Hence this study was aimed to evaluate SG levels in OC,PMD and in patients with tobacco habit.

Materials and methods: This study consist of 80 subjects, divided into mainly two groups; study and control groups. The study groupconsist of a total of 60 patients, of which 20 patients with OC, 20 patients with PMDs, and 20 patients with habit of tobacco but without any lesions at the time of study. Control group consist of 20 healthy individuals without lesions or tobacco related habits. Patients who had any systemic diseases like renal disease, diabetes, etc were excluded in the study.

Both groups consisted of both sexes and are in the age group of 15 years to 60 years. After informed consent a detailed history of habits was taken for all the patients who were first clinically diagnosed to have OC and PMDs. Fasting venous blood of 10ml from all subjects was collected in a test tube and the serum was separated from other constituents of blood using centrifuge. Serum from this collected blood sample is used for the evaluation. The biochemical evaluation is done using BS-380 chemist autoanalyzer and the results are analyzed and expressed.

The values of the test obtained is analyzed and subjected to statistical evaluation. FBS is compared in OC, PMDS, Tobacco habit patients without any lesions and controls. The statistical analysis is performed by using SPSS (statistical package for social sciences) 19.0 version software. Comparison of four groups with respect to each biochemical parameters is done by one way ANOVA.

Results: The mean serum FBS is compared with the control, patients with OC, PMDS, and patients with tobacco habit. The mean value of the FBS for control group was 92.20±11.19. The mean value in OC was 109.10±13.44. The mean value in PMDS is 104.30±14.06 and in tobacco habit patients mean value is 93.05±6.16. (Graph -I).

Comparison of the level of FBS among the four groups is done by one way ANOVA and it is found that mean value between groups was statistically significant (P<0.001). Hence FBS levels are increased. (Table -I)

FBS is substantially increased in OC patients which is statistically significant (p<0.001). PMDS also showed increased levels of FBS when compared to patients with habit and control (P< 0.05). There is no significant change of FBS in patients with tobacco habit patients (P>0.05). This suggests that there is significant increase of FBS in OC patients and PMD patients and no change of FBS in tobacco habit patient.

Discussion:

The result of this study states that serum glucose levels are substantially increased in OC & PMDS. There was no significant rise of FBS in tobacco habit patients.

Similar study conducted by Dikshit *et al.* found that the incidence of leukoplakia and lichen planus in diabetic patients is more in comparison with non-diabetic patients. They stated that a positive association between diabetes mellitus and premalignant lesions might occur due to shared risk factors.[7]

A study done by Thomas et al. analyzing the risk factors of leukoplakia, it was found that diabetic patients are three times more associated with leukoplakia than non-diabetic patients. This increased incidence might be due to the metabolic and immunologic changes in the oral mucosa.[8] This was in consistent with the present study. Increased FBS levels in PMDS can be attributed to metabolic, immunologic changes in the oral mucosa and the shared risk factors. A study conducted by Ujpál *et al.* reveals occurance of leukoplakia or erythroplakia in diabetic patients. They also stated that there is more incidences of gingival cancer and lip cancer in diabetic patients as

compared to the non-diabetic patients.[9] The result of this study is in consistent with the present study. The FBS levels are significantly increased in OC patients.

Elevated blood glucose levels can lead to excessive formation of free radicals and increased protein breakdown. It has been suggested that poor diabetic control is associated with an increased cancer risk due to enhanced oxidative damage to DNA by free radicals.[10]Also due to protein breakdown, the activity of antioxidant scavengers and enzymes is reduced. Both the increase in free radicals and oxidative stress promote carcinogenesis.[11,12]

The molecular mechanisms associated with diabetes and cancer development are still not clear. However, only few research studies have been done on diabetes and oral cancer. The association between diabetes and oral cancers may be due to shared risk factors between the two diseases. However, the etiologic factors of oral cancer such as tobacco, alcohol can also contribute to oral cancer in diabetic patients.

Benjamin AL[13]has screened 769 individuals and found that FBS was found to be higher in betal nut chewers, which was independently associated with diabetes. In the present study majority of the patient had tobacco in some form. The increased sugar levels in the present study may also be attributed to habit induced OC and PMDS. However there was no significant change of FBS in patients with only habit without any lesions.

From the findings of the this study, it is found that FBS as a biochemical indicator, has got no direct and overall significant influence associated with tobacco habit. Variability in the values of FBS in OC & PMDS patients may be due to multiple reasons, such as age, nutritional status, body mass index, alcohol consumption, exercise habits and methodological difference.

Conclusion: Diabetic patients who have habit of tobacco may constitute a relatively high-risk group for developing oral potentially malignant disorders. Diabetic patients who have oral potentially malignant disorders may constitute a relatively high-risk group for developing oral cancer. The increased sugar status may be considered as a useful indicator for initial changes occurring in the neoplastic cells. Dentists must screen all patients with diabetes for any mucosal changes.

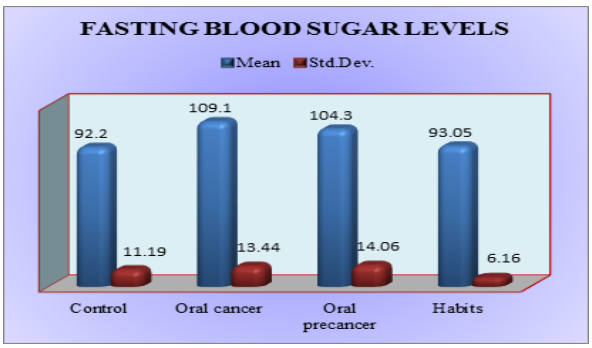
However more advanced studies are necessary to show a definitive relationship between diabetes and oral cancer.

TABLE –I: Comparison of four groups with respect to FBS by ONE WAY ANOVA

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares	F-value	P-value
Between groups	3	4199.73	1399.91	10.55	0.001***
Within groups	76	10076.15	132.58		
Total	79	14275.88			

***P<0.001**

GRAPH –I Bar graph showing comparison of four groups with respect to FBS levels.



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