International Journal of Biotechnology and Biomedical Sciences
p-ISSN 2454-4582, e-ISSN 2454-7808, Volume 5, Issue 2; July-December, 2019 pp. 108-110

http://www.krishisanskriti.org/Publication.html

Alteration of Serum Glucose Level in the Patients of Head and Neck Cancer

Sanghapriya Pal[1], Kiran Dahiya[2], Rakesh Dhankhar[3], Keerti Gupta[4], Sushil Kumar[5]

[1]Resident, Department of Biochemistry, Pt. BD Sharma PGIMS, Rohtak
[2]Professor, Department of Biochemistry, Pt. BD Sharma PGIMS, Rohtak
[3]Professor, Department of Radiotherapy, Pt. BD Sharma PGIMS, Rohtak
[4]Resident, Department of Biochemistry, Pt. BD Sharma PGIMS, Rohtak
[5]Resident, Department of Biochemistry, Pt. BD Sharma PGIMS, Rohtak
E-mail : [1]sanghapriyapal@gmail.com, [2]kirandahiya_2002@yahoo.com, [3]dhankhar.rakesh@gmail.com, [4]loveablend10@gmail.com, [5]sushil.soni87@gmail.com

Abstract—*Background- Head and neck cancer is the sixth most common cancer in the world. A few study showed the alteration of glucose metabolism following chemoradiation used to treat the disease. So, this study was planned to investigate the alteration of serum glucose level in patients of head and neck cancer.*

Materials and methodology- *Thirty patients of head and neck cancer and thirty healthy subjects were enrolled for this study. Esitimation of serum blood glucose was done in the patients before and after the treatment(group-A and group-B) and in healthy controls (group-C), and the values are analyzed by appropriate statistical method.*

Result- *It showed significant increase of the serum glucose level after treatment (p value between group A and group B is 0.001). serum glucose was significantly low in group-A than group-C (p value is 0.0004). The difference of glucose level between group-B and C was not statistically significant (p value is 0.616)*

Conclusion- *Increased glucose level can be seen in the patients of head and neck cancer following treatment and this may be related to the efficacy of the treatment.*

Keywords- *Head and Neck Cancer, Glucose.*

1. Introduction

Head and neck cancer includes all types of cancer occurring in the nasal and oral cavities, pharynx, larynx and the paranasal sinuses. Among these, majority are squamous cell carcinoma.[1] This is the sixth most common cancer in the world. Mostly it affects males in their fifth and sixth decade.. Approximate annual burden of this is 650000 cases and death rate is almost 50%.[2]There are a lot of causative factors of this with a little difference between west and Indian subcontinent. In west, smoking tobacco, drinking alcohol, poor diet are notable etiological factors while in Indian subcontinent, chewing betel or areca nut, smoking bidis& taking snuff are important.[3] There is also association of HPV & Epstein-Barr virus in the causation of this disease.[2,3] Presenting symptoms vary according to the primary sites and they include hoarseness, dysphagia, otalgia, cervical lymphadenopathy. Metastasis are not common at presentation.[4] The treatment include different modalities which may include surgery, chemotherapy, radiotherapy or combination of these depending on the sites and the final diagnosis.[5]There are many molecules which are being studied as potential biomarkers for the head and neck cancersuch as metalloproteinases, interlukein-6 and 8, CXC chemokine receptor 2 etc.[6]Hypercalcemia may be seen in 30% of malignancy but mainly in later stages of malignancies.[7]Nguyen et al reported the hyperglycemia during chemoradiation of head and neck cancer as well as development of diabetes mellitus following treatment in non diabetic patients.[8]Huang et al found development of hyperglycemic crisis in head and neck cancer patients with platinum-based chemotherapy.[9] That's why this study was done to find out any association between serum glucose levels with the treatment in the patients of head and neck cancer.

2. Materials and Methods

The study was conducted in the department of Biochemistry, Pt. BD Sharma PGIMS, Rohtak in collaboration with department of Radiotherapy, Pt. BD Sharma PGIMS, Rohtak, for which 30 newly diagnosedhistopathologically proven patient of Head and Neck Squamous Cell Carcinoma (HNSCC) and 30 age and sex matched healthy individuals were enrolled after taking proper informed consent. Diagnosis was made by detailed history, clinical examination, radiological and histopathological examinations after which staging was done by the guidelines of American Joint Committee,2010.[10] All the patients were treated with standard dose of radical external radiations (64Gy/32 fractions for 6.2 wks). Concomitant carboplatin was also administered to late

stage (III & IV) patients and their follow up were done after 6 wks.

Patients suffering from any other chronic disease (renal, hepatic, endocrinal, malignancy) that could affect study participation or confound data, patients on any other medications or supplements and lactating and pregnant females were excluded.

Estimation of serum glucose were done by standard method by Randoxautoanalyzer in all the samples of the patients before the treatment and also after the treatment at the time of follow up after 6 weeks (Group- A & B respectively) and of the healthy controls (Group- C) and the values were analyzed by appropriate statistical method.

3. Results

The mean age of HNSCC cases was 54.63±8.07 years and among controls, it was 53.37±9.12 years, with a range of 36-74 years for cases and 43-72 years for control. The difference was statistically not significant as p value was more than 0.05.

Among cases, 4 patients were below 40 years of age, 9 were between 41 to 50 years, 11 were between 51 to 60 years, 5 were between 61 to 70 years and one patient was more than 70 year old. While among controls 1 person was below 40 years of age, 13 were between 41 to 50 years, 8 were between 51 to 60 years, 6 were between 61 to 70 years and 2 persons were more than 70 year old.

Out of 30 patients, 29 (97%) of patients were males and 1 (3%) were females. In group C also same distribution of 97% males and 3% females, was seen.

Out of 30 HNSCC patients, carcinoma (Ca) larynx was the most common type with 11 patients (36.7%) followed by 10 patients of Ca Oropharynx (33%), 6 patients of Ca base of tongue (20%) and 3 patients of Ca Tonsil (10%).

Out of 30 patients, 11 presented in stage IV (36.7%) whereas 19 (63%) presented in stage III. No patients presented in early stages i.e. stage I and II.

Comparison of values of serum glucose among group-A, B and C has been shown in Table-1.

Table 1: Serum glucose levels in group A, group B and group C

Groups	Mean ± SD	Range
Group A	84.73 ± 2.97 mg/dL	57-115 mg/dL
Group B	103.46 ± 5.15 mg/dL	61-171 mg/dL
Group C	100.46 ± 2.94 mg/dL	75-137 mg/dL
p values between groups		
p value between group A and B		0.001
p value between group C and B		0.616
p value between group A and C		0.0004

4. Discussion

Serum glucose in group A was 84.73±2.97mg/dL (57-115), in group B was 103.46±5.15mg/dL (61-171) while in group C it was observed to be 100.46± 2.94 mg/dL (75-137). p value between group A and group B was 0.001. Hence significant increase in glucose levels was found in cases after treatment. p value between group B and group C was 0.616 which was not significant. p value between group A and group C was 0.0004 so cases before treatment had significantly low glucose values than controls. The results indicate a state of increased glucose utilization by actively multiplying cells for energy leading to significantly decreased plasma glucose levels in HNSCC patients before receiving treatment. After treatment the levels were increased and difference from healthy controls is statistically insignificant. In a study, a total of six out of 91 (6%) non diabetic patients developed diabetes following treatment, requiring oral hypoglycemic agents.[8] An researcher observed a similar rate (5%) of diabetes in 219 head and neck cancer patients following induction chemotherapy with CDDP-based regimen.[11] Using steroids to minimize side effects of chemotherapy may lead to diabetes as the steroids tend to cause hyperglycemia. The use of insulin for the treatment of diabetes may curtail cancer growth and progression as diabetes and cancer both are inflammatory diseases at cellular level, as per some researchers.[12]From the above study we can conclude that increased glucose level may be seen after the treatment in the patients of head and neck cancer due to decreased load of cancerous cells which may be related to efficacy of the treatment.

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