TRACE ELEMENTS (COPPER, MOLYBDENUM, SELENIUM & ZINC) AS MARKERS IN ORAL PRECANCER AND CANCER

Sunali Khanna¹, A. C. Udas², G. Kiran Kumar², S. Soundarajan² and F. R Karjodkar¹

¹Department of Oral Medicine & Radiology, Nair Hospital Dental College, Mumbai, 400008 India
²Department of Analytical Chemistry, Bhabha Atomic Research Centre, Mumbai, 400085, India

Abstract: Oral Cancer is a major cause of cancer morbidity and mortality worldwide. In India oral cancer is prevalent in most areas where tobacco related practices are observed. Imbalance in trace element profile and its modifying effects in the process of carcinogenesis warrants further investigation. The aim was to evaluate the levels of Copper (Cu), Molybdenum (Mo), Selenium (Se) and Zinc (Zn) in serum of patients of precancer (Oral Submucous Fibrosis and oral cancer {Squamous Cell Carcinoma (SCC)}) and analyze the alterations of these critical parameters. Cu/Zn ratio deemed important is determined in oral precancer and cancer. An attempt is also made to identify predictors amongst these parameters for disease occurrence and progression. This research is also undertaken to assess the tobacco related practices and socio-cultural challenges in patients of precancer and cancer. Guided dialogue techniques, questionnaires and proforma based evaluation formed a part of the study. Serum Copper and Zinc was determined using Flame Atomic Absorption Spectrometry. Serum estimation of Selenium and Molybdenum was done by Graphite Atomic Absorption Spectrometry. The socio-cultural factors pertaining to tobacco related practices bring forth stark grass root realities in this randomised controlled clinical trial. Data analysis reveals a marked, progressive and significant increase in copper levels in precancer and cancer groups as compared to the normal group. Cu/Zn ratio is slightly elevated in the cancer and precancer groups. Serum levels of Molybdenum and Selenium are significantly decreased in the precancer and cancer group. The levels of zinc are marginally elevated in the precancer and cancer. The probable predictors for disease occurrence and progression in precancer group are serum Mo and Se. In the cancer group age, Cu, Mo & Se are identified as probable predictors for disease progression. Proactive intervention would help in early diagnosis, management and monitoring the efficacy of treatment. This study shows alteration of serum levels of Cu, Mo, Se & Zn in precancer (OSMF) and cancer (SCC). An attempt is also made to identify these parameters as predictors for disease occurrence and progression. This may also serve as an additional diagnostic tool for oral precancer along with predicting malignant potential of OSMF. Further research with larger population would highlight the significance of these parameters and their importance with contributing neoplastic factors. This is a pioneering study to analyze the roles of serum copper, molybdenum, selenium, and zinc as probable biomarkers in oral carcinogenesis and disease progression.

Keywords: Oral Precancer, Oral cancer, copper, molybdenum, selenium and zinc