

## Nutrition and Immunity in Head and Neck Squamous Cell Cancer

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### Editorial

According to the 2003 report of Indian Council of Medical Research, Head and Neck Squamous Cell Carcinoma (HNSCC) is very common. In India oral cancer ranks fourth common among males and fifth common among females [1], accounting for one fourth of all male and one tenth of all female cancers [2]. In a comparison between cases of cancer in India and USA for the year 2002, it was found that the incidences of oral cancer in Indian males and females were 12.8 and 7.5 persons per 100000 populations, whereas it was much lower in USA - males and females (6.3 and 3.7 persons per 100000 populations), respectively [3]. In India, it has been found that most of the cancers present in locally advanced Stage (III/IV disease) [4] and the treatment consists of a multimodality approach with surgery, radiation therapy and chemotherapy.

In cancer patients the incidence of malnutrition can be anywhere between 40-80% [5]. The disease factors such as site of cancer and type of treatment make the nutritional management of a HNSCC patient quite complex [6]. In addition they may have a long duration of poor dietary habits and life style choices like alcohol abuse, oral tobacco usage and smoking tobacco. Patients with HNSCC usually have varying degrees of dysphagia, odynophagia, loss of weight and anorexia. The structures within the treatment field and the radiation prescription effect patient's ability to eat [7]. All these disease and lifestyle factors contribute to the malnutrition. Malnutrition may increase the risk of infection; toxicity related to treatment and finally lead to a poor quality of life and even a reduced life expectancy [8-10]. ESPEN Guidelines 19 defines severe nutritional risk as:

- Weight loss more than 10-15% within 6 months.
- BMI less than 18.5 kg/m<sup>2</sup>
- Subjective Global Assessment Grade C

- Serum albumin less than 30g/L
- Inability to maintain above 60% of recommended intake for more than 10 days.

According to the NCCN guidelines all patients with HNSCC need to undergo regular nutritional assessment starting at the time of diagnosis. Identification of patients with risk of nutritional problems early and timely interventions may reduce the chances of nutrition related morbidity [11]. The impact of malnutrition on patient's quality of life and tolerance to treatment cannot be underestimated but prospective studies have not yet shown an improvement in survival secondary to nutritional interventions [12].

In various studies, between 50% to 75% of HNSCC patients have been estimated to be malnourished [13,14]. In a study conducted in Netherlands on 1340 newly diagnosed patients with HNSCC being treated with radiation therapy, it was found that pretreatment and during treatment weight loss of more than 10 % was associated with 5 year overall survival and disease free survival of 42% and 71% respectively, as compared to 71% and 86 % in no weight loss group ( $p < 0.001$ ) [15]. After adjusting for known confounding factors, like tumor stage and location, this association of critical weight loss was lost for 5 year overall survival but prevailed as an independent prognostic marker for disease specific survival. Patients with HNSCC in India are different from the developed countries with respect to nutritional status.

In 2012, an article published in Nature emphasized, how there is need to understand more clearly the interactions between nutritional status and the immune system in humans that are living in different cultural and socioeconomic settings.

The interrelationship of nutrient metabolism and the immune system may occur at numerous levels, which range from endocrine signaling to immune cells directly sensing nutrients [16]. It is seen that during malnutrition (even of moderate severity), most host defense mechanisms may be impaired. The rapidly proliferating T cells (which respond to pathogens) are especially affected, demonstrated by a decrease in their numbers [17].

HNSCC tumors are known to produce immunosuppressive mediators affecting the immune functions in the patient. An increase in number of activated T cells occurs due to the local immunological interactions between the tumor and tumor infiltrating leukocytes [18]. Increased numbers of neutrophils, monocytes, total leukocytes and easily measured neutrophil/lymphocyte ratio was enhanced in 20 HNSCC patients as compared to 20 healthy control patients in a Sweden study, showing a poor survival in patients with increased neutrophil/lymphocyte ratio [19]. Another study comparing 146 HNSCC patients with 54 normal controls demonstrated a significantly lower absolute numbers of CD3+, CD4+ and CD+ T cells in patients than normal controls with no difference in percentage between the T cell subtypes [20].

Head and neck cancers make up approximately one-third of all cancer cases in this country in contrast to 4–5% in the developed world [4]. The treatment guidelines for HNSCC emanate mainly from the West where the patient profile, etiology, dietary habits and nutritional profile are different. The ratio of tobacco related as compared to HPV related oropharyngeal cancer has come down with decrease in use of tobacco in the West. In India ever so complex socio-economic factors in addition to Government policies contribute to a greater proportion of tobacco related HNSCC? The treatment guidelines(NCCN) for HNSCC take into consideration the TNM stage of disease as well as various poor prognostic factors (perineural invasion, vascular invasion, extra capsular lymph nodal spread, level IV,V neck node metastasis etc). Nutritional status, systemic immunity markers as early prognostic factors for HNSCC still need further exploration with well-planned prospective trials in Indian patients. A low cost model using nutritional assessment and systemic immunity marker as an early prognostic marker in patients being treated for HNSCC is the need of the day.

## References

- Ali I, Wani WA, Saleem K (2011) Cancer Scenario in India with Future Perspectives. *Cancer Therapy* 8(8): 56-70.
- Francis CJK (2016) Cancer Aetiology, Epidemiology, Prevention Head and Neck Cancers. *Annals of Oncology* 27 (9).
- Fenley J, Bray F, Pisani, Parkin D M (2001) World Health Organization. GLOBOCAN 2000; Cancer incidence, mortality and prevalence worldwide. Lyon France: IARC.
- Shah SB, Sharma S, D'Cruz AK (2016) Head and neck oncology: The Indian scenario. *South Asian J Cancer* 5(3): 104-105.
- Ollenschlager G, Viell B, Thomas W, Konkak K, Burger B (1991) Tumor anorexia: causes, assessment, treatment. *Recent Results Cancer Res* 121: 249-259.
- National Institute of Clinical Excellence Improving outcomes in head and neck cancers - The Manual (2004) London: National Institute for Clinical Excellence.
- Kelly LE, Ward E, Van As-Brooks CJ ed. Radiation and Chemotherapy Head & Neck Cancer: Treatment, Rehabilitation and Outcomes. San Diego: Plural Publishing Inc. 2007: 57-86
- Nitenberg G, Raynard B (2000) Nutritional support of the cancer patient: issues and dilemmas. *Crit Rev Oncol Hematol* 34(3): 137-168.
- Andreyev HJ, Norman AR, Oates J, Cunningham D (1998) Why do patients with weight loss have a worse outcome when undergoing chemotherapy for gastrointestinal malignancies? *Eur J Cancer* 34(4): 503-509.
- Dewys WD, Begg C, Lavin PT, Band PR, Bennett JM, et al. (1980) Prognostic effect of weight loss prior to chemotherapy in cancer patients. *American J Med*; 69 (4): 491-497.
- Donnelly R, Freeman L, Dip PG, RD Nutrition in Head and Neck Cancer. *Journal of ENT MASTERCLASS*.
- Arends J, Bodokyb G, Bozzettic F, Fearon K, Muscaritoli M, et al. (2006) ESPEN Guidelines. Enteral nutrition in non-surgical oncology. *Clinical Nutrition* 25: 245-259.
- Hammerlid E, Wirblad B, Sandin C, Mercke C, Edström S, et al. (1998) Malnutrition and food intake in relation to quality of life in head and neck cancer patients. *Head Neck* 20(6): 540-548.
- Ravasco P, Monterio-Grillo I, Vidal PM, Camilo ME (2005) Impact of nutrition on outcome: A prospective randomised controlled trial in patients with head and neck cancer undergoing radiotherapy. *Head Neck* 27(8): 659-668.
- Langius JAE, Bakker S, Rietveld DHF, Kruijzenga HM, Langendijk JA, et al. (2013) Critical weight loss is a major prognostic indicator for disease-specific survival in patients with head and neck cancer receiving

- radiotherapy. *Br J Cancer* 109(5): 1093-1099.
16. Andrew LK, Philip PA, Nicholas W G, Goodman AL, Gordan JI (2012) Human nutrition, the gut microbiome, and immune system *Nature* 474(7351): 327-336.
  17. Gredel S (2011) Nutrition and Immunity In Man. 2<sup>nd</sup> [Edn,], ILSI Europe concise monograph series. Dietary factors which alter the immune response. pp: 9.
  18. Bose A, Chakraborty T, Chakraborty K, Pal S, Baral R (2008) Dysregulation in immune functions is reflected in tumor cell cytotoxicity by peripheral blood mononuclear cells from head and neck squamous cell carcinoma patients. *Cancer Immun* 8: 10.
  19. Camilla RM, Anne MK, Rolf U, Sven B, Kristian R, et al. (2012) The Activation Pattern of Blood Leukocytes in Head and Neck Squamous Cell Carcinoma Is Correlated to Survival. *Plos one* 7(12): e51120.
  20. Iris K, Bridget H, Robert LF, William G, Theresa LW (2004) Decreased Absolute Counts of T Lymphocyte Subsets and Their Relation to Disease in Squamous Cell Carcinoma of the Head and Neck. *Clin Cancer Res* 10(11): 3755-3762.