

**BJMHR**British Journal of Medical and Health Research
Journal home page: www.bjmhr.com

Socio-Demographic, Anthropometric And Biochemical Profile Of Subjects with Head and Neck Cancer: A Pilot Study

Sheetal Vijayakumar Shenoy¹, Sudha Sairam¹, Namratha Pai Kotebagilu¹, Asna Urooj*¹

1. Department of Studies in Food Science & Nutrition, University of Mysore, Mysuru, Karnataka, India

ABSTRACT

Malnutrition is one of the most important nutritional issues that can arise during cancer treatment and it is common among patients with Head and Neck Cancer (HNC). The anatomic site of tumor can significantly affect deglutition and mastication which are the major causes of malnutrition apart from cachexia. The objective of this research work was to study the socio-demographic and nutritional status of patients with HNC. A pilot study was undertaken in patients diagnosed with HNC (n=50), attending cancer care specialty hospital, Mysuru, India. From the results, it was observed that the mean BMI of the patients (18.63 ± 3.56 kg/cm² in men, 21.06 ± 4.69 kg/cm² in women) was normal. The subjects had MUAC values lower than the standard value indicating a nutritional risk if not given attention (Men- 25.12 ± 2.47 , Women- 24.21 ± 4.24). The TSF values were lower (Men – 7.27 ± 4.19 , Women – 14.3 ± 7.64) compared to the standard value (10 in men and 13.25 in women). Hence, BMI is not an accurate tool to reflect the nutritional status. Biochemical data revealed that the haemoglobin (12.53 ± 2.24 g/dL in men, 11 ± 1.73 g/dL in women) and platelet count was lower than the normal values. The PG-SGA score revealed that 42% of the study population were in the SGA B and C category implying moderate to severe malnutrition and 54% of the patients complained of deglutition. Cancer cachexia along with lower values of anthropometric measurements and biochemical parameters reflect poor nutritional status among HNC patients undergoing chemotherapy or radiotherapy or both. Therefore, nutritional screening and assessment of the HNC patients are of utmost importance before starting the treatment regimen.

Keywords: Head and neck cancer, malnutrition, India, socio-demographic, nutritional status.

*Corresponding Author Email: asnaurooj@foodsci.uni-mysore.ac.in

Received 31 May 2017, Accepted 08 June 2017

Please cite this article as: Urooj A *et al.*, Socio-Demographic, Anthropometric And Biochemical Profile Of Subjects with Head and Neck Cancer: A Pilot Study. British Journal of Medical and Health Research 2017.

INTRODUCTION

Head and neck cancer (HNC) includes malignant tumors located in the head and neck area which are mostly squamous-cell carcinoma of the oral cavity, salivary gland, nasal cavity, paranasal sinuses, nasopharynx, oropharynx, hypopharynx, pharynx and larynx.¹ According to the World Health Organization (WHO) report on burden and trends of the non-communicable diseases (NCDs) 2010, cancer accounted for 21% of NCD deaths worldwide and 27% of global NCD deaths below the age of 70 years.² The WHO – NCD Country Profile 2014 has documented the mortality rate of 7% for cancers for all ages and both the genders in India.³ In Karnataka (Bengaluru), India, during 2007-2011, the five most leading cancer sites were hypopharynx (8.4%), oesophagus (7.9%), lung (7.0%), tongue (6.7%) and mouth (6.5%) most of which are HNCs in males and cancers of cervix (27.3%), breast (15.6%), mouth (10.3%), ovary (5.9%) and oesophagus (5.1%) in females.⁴ The malnutrition incidence in cancer patients has been estimated between 40 – 80% and approximately 50% in HNC.⁵ Cancer cachexia is a multifactorial clinical syndrome involving complications such as anorexia, early satiety, severe weight loss, weakness, anemia and edema leading to malnutrition. Loss of body mass, reduced food intake, reduced volitional capacity and poor physical function is often related to cachexia. Malnutrition during treatment can interrupt the planned regimen and reduce the effectiveness of treatment; primarily contributing to poor prognosis. Overall, the Quality of Life (QoL) of the patients is reduced due to negative impact of malnutrition on physical, cognitive and psycho-social well-being.⁶ There are limited studies on the nutritional status of head and neck cancer patients in Mysuru city. This preliminary study was carried out to assess the nutritional status of HNC patients attending cancer care hospitals for chemotherapy or radiotherapy.

MATERIALS AND METHOD

Study design:

A cross sectional pilot study was conducted in two primary care hospitals catering to cancer i.e., Preethi Cancer hospital and Bharath cancer hospital, Mysuru, India over a period of 6 months. The study was approved by the Institutional Human Ethics Committee, University of Mysore (IHEC-UOM No.37/M.Sc/2012-2013) and permission was obtained from the hospitals to conduct the study. The subjects were selected using convenient sampling technique based on their willingness to participate in the study. Informed consent was obtained from the patients according to the standard human ethics guidelines provided by the Indian Council of Medical Research. Fifty patients (Men - 37, Women - 13) with histopathologically proven head and neck cancer of all stages, undergoing chemotherapy /

radiotherapy were recruited with the help of the attending clinician. Patients who were critically ill or on enteral feed or with other cancers were excluded.

Data collection:

A pre-tested questionnaire was used to elicit general information, personal data, disease history, co-morbidities, socio-economic and demographic status and health habits of the participants. The standard Patient Generated Subjective Global Assessment (PG-SGA) tool was used to elicit information on the nutrition risk.

Anthropometric parameters:

Anthropometric measurements such as height (cm), weight (kg), Mid upper arm circumference (MUAC) (cm), waist to hip circumference (cm), triceps skin fold (TSF) (Lange Skinfold Caliper, Beta Technology Incorporated, Cambridge, Maryland) were recorded. Body Mass Index (BMI) and Mid Upper Arm Muscle Circumference (MUAMC) were calculated.

Biochemical parameters:

Biochemical information on haemoglobin, total count, platelet count, serum urea, serum creatinine and other available information were obtained from the medical records.

Statistical analysis:

The data was subjected to statistical analysis. The values of all the anthropometric data are mean of triplicates and are expressed as mean and standard deviation. The data on demography, socio-economic status, health habits, disease history, treatment regimen and PG-SGA are expressed as percentages and frequency.

RESULTS AND DISCUSSION**Demographic and socio economic status:**

Among the 50 subjects, 37 were men and 13 were women aged between 30 to 80 years. Women comprised a small number in the study group because the prevalence of HNC is higher in men than in women. Demographic characteristics and socioeconomic data of the subjects showed that, of the 13 women 92.3% were hindu (n=12), 7.6% were muslim (n=1); and among men, 91.8% were hindu (n=34), 2.7% were muslim (n=1) and 5.4% were Christians (n=2). Most of the subjects were married (100%, n=13 among women; 97.2%, n=36 among men). Majority of them belonged to nuclear family (n=31) [75.6%, n=28 among men and 23%, n=3 among women] and 19 of the subjects belonged to joint family (76.9%, n=10 among women and 24.3%, n=9 among men). The patients mostly included people from low income group, who were economically backward or from villages. Out of 50 subjects, 61.5% (n=8) of women and 40.5% (n=15) of men had no formal education; 15.3% (n=2) of women and 32.4% (n=12) of men were educated till primary school level; 23% (n=3) of

women and 18.9% (n=7) of men were educated till higher secondary level; 5.4% (n=2) of men studied till PUC and 2.7% (n=1) of men studied till graduation, majority of the women had not studied above PUC or graduation. Majority of the women were housewives (76.9%, n=10) while few who worked (23.1%, n=3) were employed in incense stick manufacturing factory. Majority of the men worked mostly as daily wagers (32.43%, n=12) as farmers, coolie or carpenter; 40.54% (n=15) were bank employee or had government jobs and 27.02% (n=10) had their income from property such as lands and fields.

Health related practices

Health related practices of the subjects showed that majority of the subjects had habit of chewing betel nut (69.32% of women and 40.54% of men) and few chewed tobacco (46.15% of women and 13.51% of men). Around 78.37% of the men had a habit of smoking beedis, 35.13 % had a habit of consuming alcohol and most of them had the habit of having tea and/or coffee. Only 10.81% of the men were indulged in exercise whereas, all the women were indulged in physical activity. The disease did not interfere with the sleep pattern in most of the subjects. The subjects were involved in recreational activities such as watching television and listening to music. Physical activity was observed to be more in women than compared to men.

Table 1: Health related practices of the subjects (n=50):

Sl. No	Health related practices	Women (n=13) (%)	Men (n=37) (%)
1	Chewing habits Betel nut	9 (69.32)	15 (40.54)
	Tobacco	6 (46.15)	5 (13.51)
2.	Smoking Beedi	0 (0)	29 (78.37)
	Cigarettes	0 (0)	0 (0)
3.	Drinking Tea	3 (23.08)	32 (86.48)
	Coffee	10 (76.92)	34 (91.89)
	Alcohol	0 (0)	13 (35.13)
4.	Exercise Household work	13 (100)	0 (0)
	Walking	13 (100)	4 (10.81)
5.	Sleep No sleep	1 (7.69)	2 (5.4)
	Moderate sleep	3 (23.07)	6 (16.21)
	Good sleep	9 (69.23)	29 (78.37)
6.	Recreation Watching television	5 (38.46)	24 (64.86)
	Listening to music	8 (61.53)	32 (86.48)
	Reading	0 (0)	3 (8.1)

Disease history and treatment regimen

Disease history and related data is presented in Table 2. The results showed that most of the subjects (n=30, 60%) were diagnosed of cancer recently (60% in ≤ 3 months), while 12 of the subjects were diagnosed six months prior and the rest were diagnosed with HNC a year or longer.

The most common symptom of HNC experienced by the subjects was swallowing problem which was observed in 54% of the study population. Other symptoms included lump or ulcer in the throat, observed in 26% and the rest (20%) of them experienced hoarseness in the voice. The most common initial symptom was swallowing problem especially while consuming food, which lead them to visit a clinic for further investigation of the problem.

The most common type of HNC among the subjects was tumor at the base of the tongue (64%), in which majority was due to betel nut chewing in women and beedi smoking in men, while 26% of the cases were pharyngeal cancer, 6% of nasopharyngeal cancer and 4% of oesophageal cancer. The most common type of therapy received was chemo-radiotherapy (58%) followed by chemotherapy (32%) and radiotherapy (10%). Chemo-radiotherapy has been shown to give better results in subjects with advanced HNC. Sixteen percent of the population had undergone surgery and were receiving chemotherapy/radiation therapy post-surgery. The second common type of therapy is chemotherapy which is economically viable for low income group or socially backward subjects who cannot afford an expensive treatment exclusively for cancer.

Table 2: Disease History and Related Data

	Disease history	Number (%)
Diagnosis of disease	3 months	30(60)
	6months	12(24)
	1 year	5(10)
	2 years	3(6)
Most common symptom	Swallowing problems	27 (54)
	Lump or ulcer in the mouth or throat	13(26)
	Hoarseness in voice	10(20)
Treatment	Chemotherapy (CT)	16(32)
	Radiotherapy (RT)	5(10)
	Both CT and RT	29(58)
	Surgery	8(16)
Type of cancer	Pharynx	13 (26)
	Nasopharynx	3 (6)
	Base of Tongue	32 (64)
	Oesophagus	2 (4)

Anthropometric data:

The data on the anthropometric measurements of the 50 patients were classified according to their gender. Mean and standard deviation were calculated. Anthropometric data showed that the women subjects were aged between 32-75 years, their average height was 151.6±6.88 cm, while the male subjects were aged between 38-74 years and their mean height was 167.16±5.74 cm, which is similar to the reported average Indian heights 161cm for women and 173cm for men.⁷ The subjects had MUAC values were lower (Men=25.12±2.47, Women=24.21±4.24) than the normal value (Men=33.71±1.44 and women=31.68±1.17) indicating a

nutritional risk. The TSF values were lower (Men – 7.27 ± 4.19 , Women – 14.3 ± 7.64) compared to the standard value (14.975 ± 0.62 in men and 23.3 ± 1.76 in women) [Standard values of MUAC and TSF is derived from the average of means of all racial and ethnic group of age 20 and older of the National Health and Nutrition Examination Survey (NHNES) 2007-10 data].⁸ The mean of WHR was higher (Men- 1.13 ± 1.21 , Women- 1.09 ± 0.54) than the standard value (0.85 for men and 0.8 for women) showing abdominal obesity. The mean value for BMI (Men- 16.7 ± 9.24 , Women- 19.55 ± 14.17) was lower in men when compared to the standard value ($<23\text{kg/m}^2$ for normal Asian Indians)⁹ indicating under nutrition, as shown in Figure 1 and 2.

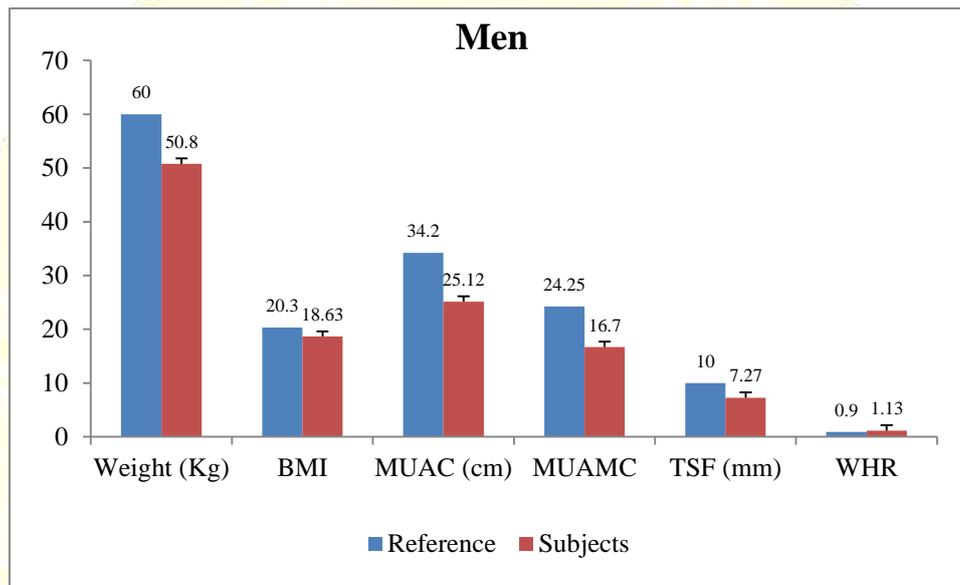


Figure 1: A comparison between anthropometric measurements of male subjects of the study group with reference values for normal adults.

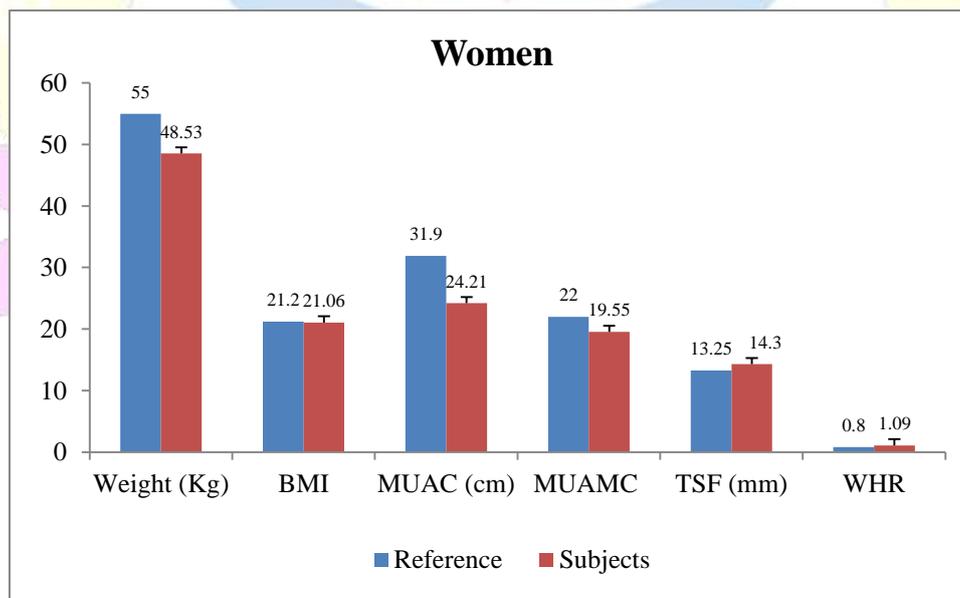


Figure 2: A comparison between anthropometric measurements of female subjects of the study group with reference values for normal adults.

Biochemical status

The biochemical parameters evaluated in the two groups of men and women from the medical reports recorded in the hospitals is given in table 3. The most common biochemical parameters that were recorded in the hospital were haemoglobin, random blood glucose, platelet count, total count (WBC), serum urea, serum creatinine, differential count (neutrophils, leukocytes, eosinophils). The haemoglobin levels were below normal levels in both the groups. The random blood glucose was within normal range for both the groups. The platelet count was lower than the normal value (14L/cmm) while total count was well within the range, serum urea and serum creatinine was within the range of normal values for both the groups. The percentile of differential count was within the normal range for both men and women, only the neutrophil count for men was slightly higher (72.9%) than the normal values.

Table 3: Biochemical Parameters of the Subjects (mean±SD):

Components	value		Range of normal value
	Women (N=13)	Men (N=37)	
Hemoglobin(gm%)	11±1.73	12.53±2.24	(F) 12-16/(M) 14-18
Random blood glucose(mg/dl)	119.22±49.47	96.16±32.48	90-120 mg/dL
Platelet count(cmm)	279000±85952.1	296129.03±154442.5	14L/cmm
Total count(cmm)	6708.18±2001.4	7615.16±2564.2	4,000-11,000/cmm
Serum urea (mg/dl)	20.07±6.73	24.48±13.92	20-45mg/dl
Serum creatinine(mg/dl)	1.31±1.79	1.6±2.1	0.9-1.7 mg/dl
Differential count (%)			
Neutrophils	62.7±5.02	72.9±18.3	40-70%
Leukocytes	31.71±4.53	24.4±8.96	20-40%
Eosinophils	5.57±1.9	5.57±1.9	1-6%

F- female, M – male. The values are expressed as mean±SD

PG-SGA data:

(PG-SGA) tool is used worldwide. It is a modification of an earlier tool called SGA. It has two sections: a patient-completed section which includes data regarding weight history, symptoms, dietary intake and activity level; and a section completed by the healthcare professional, who evaluates metabolic demand, considers disease in relation to nutritional requirements and incorporates a physical assessment.¹⁰

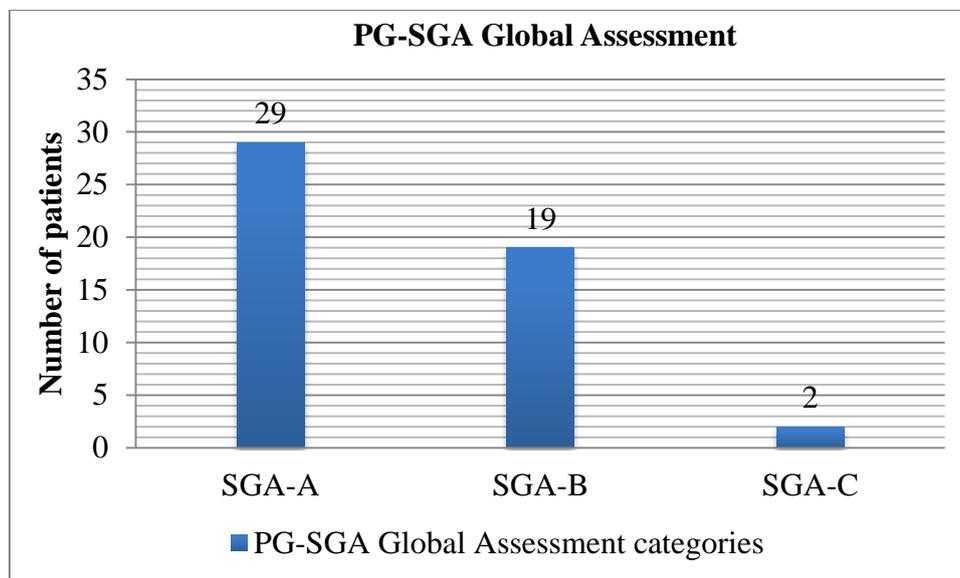


Figure 3: PG-SGA Global assessment categories of the HNC patients (n=50). SGA-A: Well- nourished or anabolic, SGA-B: Moderate or suspected malnutrition, SGA-C: Severely malnourished.

The PG-SGA global assessment categories of the patients are given in figure 3. It was observed that 29 patients (58%) were in the SGA-A category implying that the patients were well- nourished or anabolic, 19 patients (38%) were under the SGA-B category and were moderately malnourished and 2 patients (4%) were under the SGA-C category and were severely malnourished.

The somatic status of the subjects indicated that weight, TSF, MUAC, MUAMC were lower to the normal values, from this we can elucidate that after the onset of the disease the subjects had undergone weight loss, it can be due to the poor food intake or due to complications after the onset of the disease resulting in cancer induced or hospital induced cachexia. The haemoglobin and platelet count was lower than the normal range as observed from the biochemical parameters. The results demonstrate that majority of the subjects had lower nutritional status.

DISCUSSION:

Patients with head and neck carcinomas often lose a significant percentage of weight, which correlates with the complication rate.¹¹ Weight loss is frequently the first symptom occurring in cancer patients. Depending on tumour entity, weight loss is reported in 30 to more than 80% of patients and is severe (>10% of initial weight) in some 15%. The systemic inflammatory reaction that develops with many cancers is an important cause of loss of appetite (anorexia) and weight. The syndrome of decreased appetite, weight loss, metabolic alterations and inflammatory state is referred to as cachexia, cancer cachexia or cancer anorexia–cachexia syndrome (CACS).¹² Malnutrition is one of the most significant issues that

can arise during cancer treatment. Patients with head and neck cancer (HNC) undergoing chemo-radiotherapy are at high risk of malnutrition which is related to complication rate, may result from the disease process, from the antineoplastic surgery, or from both¹³ leading to negative outcomes.¹⁴ Thus, nutritional depletion in HNC patients is a well-known phenomenon, adequate dietary intake, nutritional support, nutritional supplementation should be provided to improve or maintain nutritional status. Early nutrition intervention in patients with HNC receiving chemo-radiotherapy resulted in an improved treatment tolerance and fewer admissions to hospital.¹⁵

Though most of the research findings highlight the positive effects of tea and coffee for being sources of antioxidants, frequent consumption of hot tea and coffee could possibly be a risk factor for head and neck cancer. Almost 6 million people die from tobacco use each year, both from direct tobacco use and second-hand smoke. By 2020, this number will increase to 7.5 million, accounting for 10% of all deaths. Smoking is estimated to cause about 71% of lung cancer, 42% of chronic respiratory disease and nearly 10% of cardiovascular disease. Tobacco use and exposure comes in both smokeless and smoking forms. Smokeless tobacco is consumed in un-burnt forms through chewing or sniffing and contains several carcinogenic, or cancer-causing, compounds. Smokeless tobacco has been associated with oral cancer, hypertension, heart disease and other conditions. Smoking tobacco, by far the most commonly used form globally, contains over 4000 chemicals, of which 50 are known to be carcinogenic. In India alone, about 700 billion 'bidis' (a type of filter-less hand-rolled cigarette) are consumed annually.¹⁶

In a study conducted by Brookes,¹⁷ in 114 untreated head and neck cancer patients, nutritional deficit was observed in 37.7% of the study population. It must be noted that nutritional status worsens with treatment induced complications. The study also reported that the survival rate was higher in well nourished patients (57.5% at 2 years) than malnourished patients (7.5% at 2 years). The PG-SGA results were comparable to the results published by Isenring *et al.*,¹⁸ studied among 60 cancer patients undergoing treatment. It was observed that 65% of the subjects were well nourished, 28.3% were moderately nourished and 6.7% were severely malnourished. Therefore, tumor location, cancer cachexia along with treatment can lead to compromised nutritional status thereby increasing the risk of mortality.

ACKNOWLEDGEMENT:

The authors thank the patients, hospital staff and the clinicians for their support throughout the study. The authors thank UGC-DRS II program for funding the project work.

CONCLUSION:

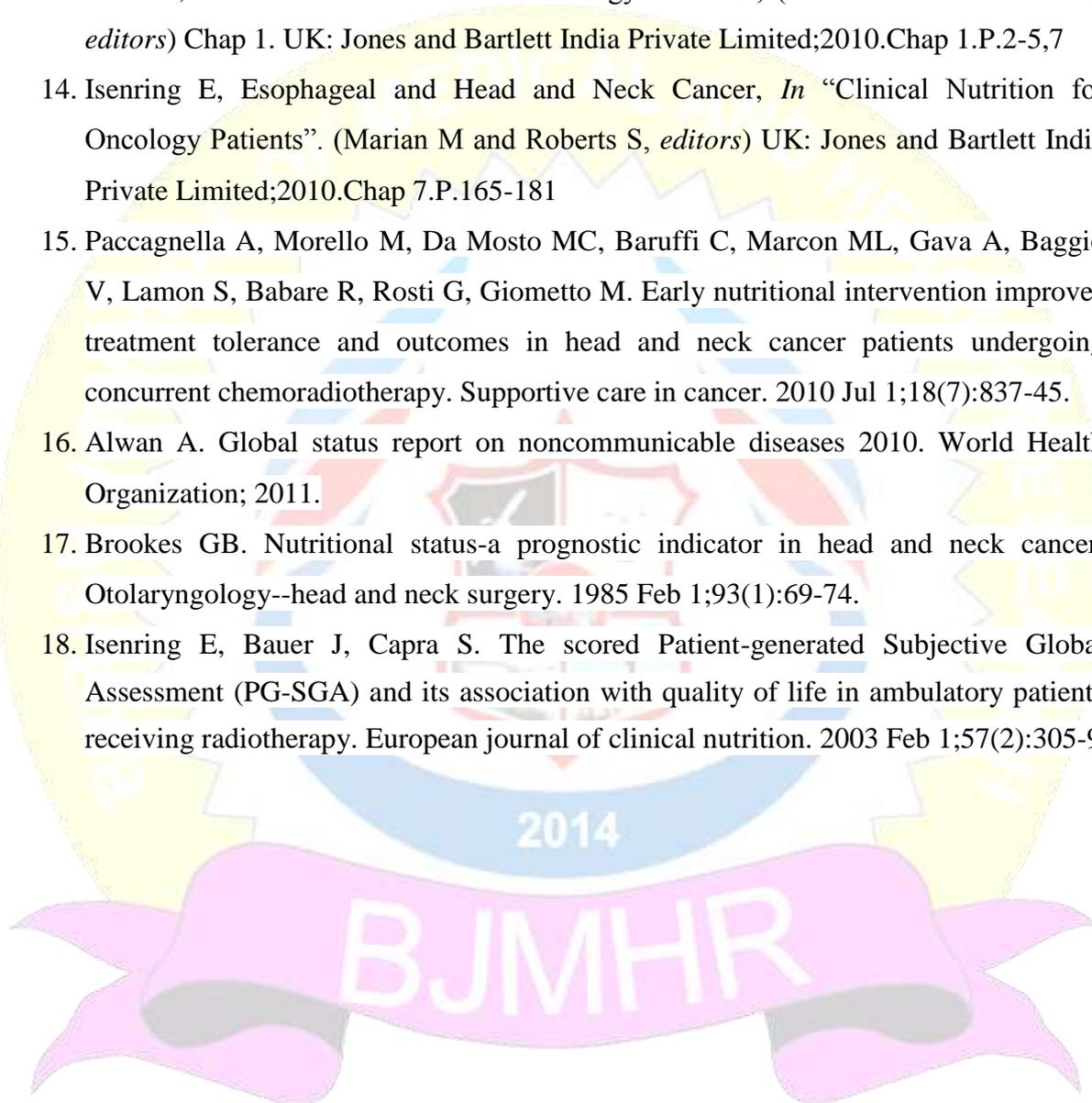
Patients with head and neck cancer may experience a broad spectrum of debilitating oral complications during or after radiotherapy and chemotherapy. Many patients report problems and pain in the mouth after cancer treatment. Almost all of the patients who receive radiation and chemotherapy to head and neck experience oral complications. Thus, patient's nutrition needs are to be addressed at the earliest.

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