UNIVERSITI PUTRA MALAYSIA

IMPACT OF NUTRITIONAL STATUS ON THE QUALITY OF LIFE IN HEAD AND NECK CANCER PATIENTS UNDERGOING RADIOTHERAPY

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By

NORIATI BINTI UJANG

Thesis submitted to the School of Graduate Studies, Universiti Putra Malaysia, in fulfilment of the Requirements for the Degree of Master Of Science

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DEDICATION

This thesis is dedicated to

All patients who had participated in this project

For their support, cooperation and courage in making this study a reality and their families for the patience shown in the face of adversity.

My husband, Zainudin and four children Mawaddah, Munif, Muntasir and Mus'ad

For their continuous support, patience, understanding and sacrifice of family time from the beginning till the completion of this thesis.

The soul of my parents, Ujang bin Salleh and Sara binti Mahmud

Who had brought me up in this world with love and kindness and always inspired me to be a successful and learned person.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Master of Science

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July 2009

Chairman: Mirnalini Kandiah, PhD

Faculty: Medicine and Health Sciences

Malnutrition is prevalent in head and neck cancer patients due to premorbid lifestyles, local effects of the tumor, and side-effects of the treatment. Malnutrition has been reported to have a negative impact on the quality of life of these patients while undergoing treatment. This study aims to determine the impact of nutritional status on quality of life of head and neck cancer patients undergoing radiotherapy (primary, adjunctive to surgery or combined with chemotherapy), as well as to identify the contributing factors to these parameters.

A cross-sectional study was carried out in a convenience sample of 50 head and neck cancer patients receiving radiotherapy (primary, adjunctive to surgery or combined with chemotherapy) who were admitted to the oncology wards, Hospital Kuala Lumpur. Nutritional status was assessed objectively by using combination of anthropometry, biochemical and dietary method, and subjectively (using Patient-Generated Subjective Global

Assessment or PG-SGA). Quality of life was evaluated by using the European Organization for Research and Treatment of Cancer Quality of Life Core Questionnaire (EORTC QLQ-C30 and its head and neck module (EORTC QLQ-H&N35).

Of 50 patients, 58% (n=29) were found to be malnourished by using objective criteria, while 84% (n=42) were found to be malnourished by using subjective measure (PG-SGA). Poor quality of life was reported in 56% of the patients. None of the sociodemographic factors studied was associated with malnutrition. Bivariate analysis showed that two clinical variables (treatment type and radiation dosage) significantly affected nutritional status. Chemoradiated patients were found to be more malnourished than those treated with radiotherapy alone or post-operative radiotherapy ($F= 7.832$, $p<0.05$). Multivariate analysis revealed that neoadjuvant chemoradiation and post-operative radiotherapy significantly affected nutritional status ($F = 12.085$, $p= 0.000$, $R^2= 0.340$). Both contributed 34% of the variance seen in the nutritional status of the patients.

In terms of QoL, 56% of patients had poor QoL. Bivariate analysis showed that treatment modality and nutritional status were significantly associated with QoL. Post-operative radiotherapy was associated with better quality of life, followed by those treated with radiotherapy alone, neoadjuvant chemoradiation and concurrent chemoradiation ($F= 6.721$, $p<0.05$). As

anticipated, malnourished patients had significantly poorer QoL (Mann-Whitney test = 66.5, $p<0.05$). However, multivariate analysis revealed that nutritional status was not a significant contributor of QoL. The only two significant contributors of QoL were household income and post-operative radiotherapy, and both explained about 40% of the variance seen in the QoL of the patients ($F= 14.901$, $p = 0.000$, $R^2 = 0.398$).

In short, the results of this study has highlighted that malnutrition was very prevalent in head and neck cancer patients. The findings also provide an insight into factors that contribute to both nutritional status and QoL. A longitudinal study is needed in order to determine the real effect of treatment over time in both nutritional status and QoL of the patients.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KESAN STATUS PEMAKANAN TERHADAP KUALITI HIDUP PESAKIT KANSER KEPALA DAN LEHER YANG MENJALANI RADIOTERAPI

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Masalah malpemakanan adalah sangat ketara di kalangan pesakit kanser kepala dan leher yang berpunca daripada gaya hidup sebelum sakit, lokasi tumor dan kesan sampingan rawatan. Masalah malpemakanan telah dilaporkan sebagai memberi kesan negatif terhadap kualiti hidup pesakit semasa menjalani rawatan. Kajian ini bertujuan untuk menentukan kesan status pemakanan ke atas kualiti hidup pesakit semasa menjalani rawatan radioterapi (primer, pasca pembedahan atau kombinasi bersama kemoterapi) serta mengenalpasti faktor-faktor penyumbang kepada kedua-dua parameter tersebut.

Satu kajian keratan rentas telah dijalankan ke atas 50 orang pesakit yang menjalani rawatan radioterapi (primer, pasca pembedahan atau kombinasi bersama kemoterapi) di wad onkologi, Hospital Kuala Lumpur. Status pemakanan dinilai secara objektif menggunakan kombinasi kriteria

antropometri, biokimia dan diet, dan secara subjektif (menggunakan Penilaian Subjektif Global Janaan Pesakit atau PG-SGA). Kualiti hidup dinilai menggunakan borang kaji selidik "European Organization for Research and Treatment of Cancer Quality of Life Core Questionnaire (EORTC QLQ-C30)" dan modul kanser kepala dan leher (EORTC QLQ-H&N35).

Daripada 50 orang pesakit, 58% (n=29) mengalami malpemakanan berdasarkan kaedah objektif, manakala 84% (n=42) mengalami malpemakanan berdasarkan kaedah subjektif. Tiada perkaitan diantara faktor sosiodemografi yang dikaji dengan status pemakanan. Analisis bivariat menunjukkan hanya faktor jenis rawatan mempunyai perkaitan beerti dengan status pemakanan. Pesakit yang menjalani kemoradiasi didapati lebih cenderung mengalami malpemakanan berbanding mereka yang menjalani radioterapi sahaja atau radioterapi pasca-pembedahan ($F=7.832$, $p<0.05$). Hasil analisis lanjut mendapati bahawa status pemakanan hanya dipengaruhi oleh jenis rawatan sahaja iaitu kemoradiasi neoadjuvan dan radioterapi pasca pembedahan ($F=12.085$, $p=0.000$, $R^2=0.340$). Kedua-dua faktor menyumbang sebanyak 34% kepada varians status pemakanan pesakit.

Manakala bagi kualiti hidup pula, 56% daripada pesakit melaporkan kualiti hidup yang rendah. Analisis bivariat menunjukkan jenis rawatan dan status pemakanan mempengaruhi kualiti hidup secara signifikan. Rawatan

radioterapi pasca pembedahan dikaitkan dengan kualiti hidup yang lebih tinggi diikuti oleh rawatan radioterapi, kemoradiasi neoadjuvan dan kemoradiasi serentak ($F= 6.721$, $p<0.05$). Seperti yang dijangka, pesakit yang mengalami malpemakanan mempunyai kualiti hidup yang lebih rendah secara signifikan (Ujian Mann-Whitney = 66.5, $p<0.05$). Walaubagaimanapun, analisis lanjut menunjukkan status pemakanan tidak menyumbang secara signifikan kepada kualiti hidup. Hanya dua faktor iaitu pendapatan isi rumah dan radioterapi pasca pembedahan mempengaruhi kualiti hidup secara signifikan ($F=14.901$, $p=0.000$, $R^2=0.398$). Kedua-dua faktor menyumbang hampir 40% kepada varians kualiti hidup pesakit.

Kesimpulannya, kajian ini menunjukkan bahawa malpemakanan adalah sangat ketara di kalangan pesakit kanser kepala dan leher. Hasil kajian turut memberi petunjuk kepada faktor-faktor yang mempengaruhi status pemakanan dan kualiti hidup. Kajian jangka panjang diperlukan bagi melihat kesan sebenar rawatan terhadap status pemakanan dan kualiti hidup pesakit.

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I certify that an Examination Committee met on 9th July 2009 to conduct the final examination of Noriati binti Ujang on her Master of Science thesis entitled "Nutritional Status and Quality of Life in Head and Neck Cancer Patients Undergoing Radiotherapy" in acordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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Date: 16 October 2009

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

_____

NORIATI BINTI UJANG

Date : 9 November 2009

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GLOSSARY OF TERMS

1. **Head and neck cancers -** refer to a group of biologically similar malignant cancers arising from the upperaerodigestive tract (UADT) which include the lip, oral cavity (mouth), nasal cavity, paranasal sinuses, pharynx, and larynx (Sanderson & Montague, 2004, Rhys Evans & Patel, 2003). Majority (90%) are squamous cell carcinomas.

2. **Squamous cell carcinomas (SCC) -** tumors arising from the mucosal linings of the upper aerodigestive tract, which are the major types in head and neck cancers (Sanderson & Montague, 2004).

3. **Oral cavity –** the mouth

4. **Nasal cavity -** the passageway just behind the nose through which air passes on the way to the throat during breathing (Cleveland Clinic, 2005)

5. **Paranasal sinuses -** small hollow spaces around the nose lined with cells that secrete mucus communicating with the nasal cavity, within the bones of the skull and face (Cleveland Clinic, 2005).

6. **Oral cavity cancer -** cancer that forms in tissues of the lip or mouth. This includes the front two thirds of the tongue, the upper and lower

gums, the lining inside the cheeks and lips, the bottom of the mouth under the tongue, the bony top of the mouth, and the small area behind the wisdom teeth (Siteman Cancer Centre, 2008).

7. **Nasopharyngeal carcinoma -** cancer originating in the nasopharynx, the passageway at the back of the nose, which connects the nose to the pharynx and acts as a shared passageway for air and food (Gale Encyclopedia of Cancer, 2006).

8. **Oropharyngeal carcinoma -** cancer that develops in the part of the throat just behind the mouth, called the oropharynx. Sometimes this is called throat cancer. The oropharynx begins where the oral cavity stops. It includes the base of tongue (the back third of the tongue), the soft palate (the back part of the roof of the mouth), the tonsils, and the side and back wall of the throat (American Cancer Society, 2007).

9. **Laryngeal carcinoma -** cancer originating from the larynx (often called the "voice box" or "Adam's apple"). For the purpose of tumour staging, it is divided into three levels -- the glottis (or the vocal cords), the supraglottis (the area above the vocal cords including the epiglottis), and the subglottis (the area below the vocal cords) (Swierzewski, 2008).

10. **Radiotherapy - t**he use of ionizing radiation for the treatment of malignant disease. It comprises both external beam therapy and brachytherapy. *External beam therapy* uses a machine, for example deep X-ray set or linear accelerator as the source of radiation. *Brachytherapy* - uses radioactive material sealed in needles or catheters and placed directly or near to the tumors (also known as "implant radiation") (Rhys Evans *et al*., 2003).

11. **Radiation dosage - *t***he quantity of ionizing radiation energy absorbed per unit mass of tissue. The SI unit of absorbed dose is the gray (Gy), defined as an energy absorption of 1 joule/kg. Other unit used is rads (100 rads = 1 Gy) (Rhys Evans *et al*., 2003).

12. **Fractionation - t**he division of total dose of radiotherapy (external beam therapy) into a number of smaller doses delivered over a period of several weeks. The aim is to increase the differential effect of the radiation on the tumor compared with the normal tissues. The standard fractionation which is generally accepted is 1.8-2 Gy/fraction, 5 days per week to a total dose of 66-70 Gy in an overall treatment time of 6.5-7 weeks.
(Rhys Evans *et al*., 2003).

13. **Chemotherapy -** ***t****he* use of potent anti-cancer drugs to treat cancerous cells. In most cases, chemotherapy works by interfering with the cancer cell's ability to grow or reproduce (NHS Direct, 2008).

14. **Chemoradiation –** treatment that combines radiotherapy and chemotherapy. The drugs may be given before radiotherapy (neoadjuvant or induction chemotherapy) or during radiotherapy (concurrent or synchronous chemotherapy) (Henk, 2003).

15. **Nutritional impact symptoms -** refer to symptoms arising from adverse effects of treatment which impair food intake. Chemotherapy causes nausea, vomiting, diarrhea and *mucositis (*irritation or ulceration of the mucosa lining of the digestive tract particularly the tongue, mouth, and throat). Radiotherapy to head and neck areas causes:

    - *Xerostomia* - dry mouth
    - *Dysphagia* - difficulty in swallowing
    - *Odynophagia* - pain on swallowing
    - *Ageusia* - loss of taste
    - *Dysosmia* - altered sense of smell
    - *Hypogeusia* - diminished sense of taste
    - *Dysgeusia* - altered sense of taste

    (Ottery, 1995; Wojtaszek *et al.*, 2002)

16. **Enteral or tube feeding –** provision of nutrition via tube to the digestive tract to a patient who cannot take in, chew, or swallow food but who can digest and absorb nutrients. Different types of tubes can be used for feeding. A tube which is placed through the nose into the stomach or bowel is called a nasogastric or nasoenteral feeding tube. Sometimes the tube is placed directly through the skin into the stomach or bowel. This is called a gastrostomy or jejunostomy (ASPEN, 2006).

17. **Quality of life -** a subjective multidimensional construct representing functional status, psychosocial well-being, health perceptions and disease/treatment-related symptoms (Ferrell BR *et al*., 1996)

18. **Age-standardized incidence rate -** a summary measure of a rate that a population would have, if it had a standard age structure. Standardization is necessary when comparing several populations that differ with respect to age because age has such a powerful influence on the risk of cancer. The most frequently used standard population is the World standard population. The calculated incidence rate is then called the World Standardized incidence rate. It is also expressed per 100,000 (IARC, 2005).

LIST OF ABBREVIATIONS

ASR	Age-standardized incidence rate
EBV	Epstein-Barr Virus
EORTC QLQ-C30	European Organization for Research and Treatment of Cancer Quality of Life Core Questionnaire
EORTC-HN35	European Organization For Research And Treatment Of Cancer Quality Of Life Head And Neck Cancer-Specific Module
MUAC	Mid Upper Arm Circumference
MUAMC	Mid-Upper Arm Muscle Circumference
NCR	National Cancer Registry
NPC	Nasopharyngeal carcinoma
PG-SGA	Patient-Generated Subjective Global Assessment
QoL	Quality of life
TSF	Triceps Skinfold
SCCHN	Squamous Cell Carcinomas Of the Head And Neck