

## Effects of High Calories High Protein Intake to Nitrogen Balance in end Stage of Nasopharyngeal Carcinoma Patient

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### ABSTRACT

Nasopharyngeal carcinoma is a malignant tumor that grows in nasopharynx with Rosenmuller fossae and nasopharyngeal roof as its predilection area. Early high calorie high protein intake administration, since the patient is diagnosed with cancer, might diminish the protein catabolism that could be simply observed through body weight loss, decreased urea secretion in urine, and faster rate of positive nitrogen balance. This is an experimental research with cross-over design. Purpose: To know the effect of high calorie high protein intake and education on nitrogen balance which are done to end stage nasopharyngeal carcinoma whose have been treated and agreed to be included in the research for 2 weeks. The study samples are 30 to 65 years old. Samples are obtained with consecutive sampling method until it achieves the sample amount. Total samples are 20 samples. Results: in the patients whose given education and high calorie high protein intake there is an increased rate in energy intake ( $2224 \pm 219-2753 \pm 329,32$ ), protein intake, ( $89,80 \pm 10,24-110,67 \pm 13,61$ ), UUN ( $8,73-8,28$ ), and nitrogen balance ( $1,9-5,2$ ).

Conclusion: Giving education and high calorie high protein intake will increase energy intake, protein intake, and nitrogen balance.

**Keywords:** End stage nasopharyngeal carcinoma, high calorie high protein, nitrogen balance.

### INTRODUCTION

Nasopharyngeal carcinoma is the most common malignant tumor in the Ear Nose and Throat Department. Based on GLOBOCAN 2012, there are 87.000 new cases of nasopharyngeal carcinoma each year with 51.000 death because of this cancer. Nasopharyngeal carcinoma usually found in found in men of reproductive age (male and female ratio is 2,18:1) and 60% of patients between 25 and 60 years of age (GLOBOCAN.,2012; Fearly., 2015; Chang.,2006).

Malnutrition has an effect to the immune system dan decreasing the patient's tolerance to cytostatics, radiation and surgery. Malnutrition affects treatment outcomes. Malnutrition and anorexia are poor indicators of mortality related prognosis (Evans., 2008, Sukrisman., 2006). The most common deficiency found in cancer patients are energy and protein deficiency. This is because the cancer patients have increased protein turnover resulting in reduced protein mass. Low energy and protein intake causing weight loss thereby increasing the speed of basal metabolism and gluconeogenesis



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as well as decreased protein synthesis of the body. The success of cancer treatment is determined by the patient's nutritional status. Nutritional support is an important part in supporting cancer therapy (Raubun.,2005). One study at Landspítali University Hospital Reykjavik Iceland by Geirsdóttir and Thorsdóttir (2008) in 30 cancer patients who performed chemotherapy was 23% malnutrition. The majority of 21 patients lost protein, although energy and protein intake was within normal limits.

## METHOD

### Research Design

This study is an observational research using cross sectional design by giving high calories high protein intake to end stage nasopharyngeal carcinoma patients.

### Sample Research

The sample of this study are end stage (stage III and IV) nasopharyngeal carcinoma patient whose come to Oncology division ENT polyclinic Sanglah General Hospital within May to July 2017. Samples were chosen by consecutive sampling according to predetermined inclusion and exclusion rules. In this study the total samples are 16 people.

### Data Collection Method

The study was divided into two periods before treatment and after treatment.

### On H-1 to H0

The subjects were interviewed to obtain food intake data with food recall method for 1x24 hours (H-1 to H0). After that measured height, weight and given nutrition counseling by nutritionists about provided planned food intake.

### Treatment period 1 (H1 to H6)

All subjects who have received a food intake sheet then record the food intake on day 1 to day 6 which will evaluated and analyzed on day 7. The analysis of energy and protein intake using nutrisurvey 2005.

### On H7

The 24 hour urine sample is taken to Sanglah General Hospital Laboratory for processing.

### Treatment period 2 (H8 to H13)

All subjects who had taken 24-hour urine sample were given a high-calories high protein diet 2ge/BW/day according to total energy requirements for the next 6 days and recorded them in a 24-hour food record.

### Day 14

The subjects returned with 24-hour urine sample and examined for 24-hour urine urea nitrogen and submitted the food records (day 8 to 13). The analysis of energy and protein intake data using nutrisurvey 2005.

### Monitoring

To find out the subject obey or follow all the food instruction given, they are reminded over the phone every day through the family or home visit if possible.

### Data processing

Data analysis in this research consists of descriptive, bivariate, and multivariate analysis. The statistical test which is used is paired t-test, followed by multivariate analysis by using shapiro wilk test. The results are presented in the form of tables and narratives.

## RESULT

Descriptive statistic analysis was conducted on the characteristics of research subjects including age, sex, ethnicity, occupation, education and clinical stage. The mean age of patients in this study is 47,80 with a standard deviation of 9,49. The youngest age is at the age of 31 years and the oldest age is 65 years. Characteristics on the study subjects is more men than women, consisting of 15 men (75%) and 5 women (25%). The most derived tribe is Balinese as many as 14 people (70%), Sasak 4 people (20%) and Javanese 2 people (10%). The highest number of employment is civil servant as many as 6 people (30%), private as many as 3 people (15%), entrepreneurs 3 people (15%), peasants 3 people (15%), labor 3 persons (15%) and not working as much 2 people (10%). The highest education is senior high school as many as 8 persons (40%), elementary school as many as 5 persons (25%), junior high school as many as 4 persons (20%) and

bachelor degree as many as 3 persons (15%). The most common stage is IVB 8 persons (40%), stage IVA 7 persons (35%), stage III 4 persons (24%) and IVC 1 person (5%).

Table 5.1 shows the distribution of study subjects based on body weight, BMI, total energy requirements, protein requirements, pre-educational energy intake, protein intake before meals, urine ureum nitrogen before treatment and nitrogen balance before treatment.

Table 5.2 shows an assesment of energy intake, protein based on 1x24 hour food recall, food record, UUN and nitrogen balance through 24-hour urine sample before the first treatment with education.

Table 5.3 shows the value of energy intake, UUN protein and nitrogen balance on education only group and education+high calories high protein intake

**DISCUSSION**

On the educational course alone found a significant increase in protein intake and UUN velues. Patients with high-protein diet will increase blood urea levels as well as urine ureum. The most common nutritional deficiencies found in cancer patients are calories and protein deficiency with reduced muscle mass manifestation, while malnutrition has an effect on immune system, decreasing patients tolerance of cytostatics, radiation and surgery. In the study at Dr. M Jamil

**Table 1: The distribution of study subjects based on body weight, BMI, total energy requirements, protein requirements, pre-educational energy intake, protein intake before meals, urine ureum nitrogen (UUN) and nitrogen balance before treatment**

Variable	Mean	P
Body weight(Kg)	58,20±11,02	0,99
BMI(kg/m <sup>2</sup> )	22,14±3,49	0,47
Total energy requirements(calories)	2150±270,47	0,03*
Protein requirements(gr/hr)	83,92±12,52	0,14
Pre-educational energy intake (calories)	2154±427,45	0,40
pre-educational protein intake(gr/hr)	77.190±19.39	0,24
UUN before treatment	7,54±5,51	0,00*
Nitrogen balance before treatment	1,32±6,57	0,00*

\*=abnormal distribution

**Table 2: Difference of each variable on group P1 (education)#**

Variable	Pre-education	Post-education	P
Energy	2154,7±427,4	2223±219,49	0,53
Protein	77,19±19,39	89,80±10,24	0,014
UUN	6,58(0,2-28,72)	8,73(0,7-20,81)	0,00
Nitrogen balance	2,6(-22,14-7,63)	1,9(-9,54-8,32)	0,482

#= independent t test from the analysis test obtain on the education group there is a meaningful value on protein intake and UUN with p value of 0,014 and 0,00.

**Table 3: Difference in each variable on group P2 (education+high calories high protein intake)#**

Variable	Education	Education+high calories high protein intake	P
Energy	2223±219,49	2753±329,32	0,000
Protein	89,80±10,24	110,67±13,61	0,000
UUN	8,73(0,7-20,81)	8,28(0,2-32,82)	0,00
Nitrogen balance	1,9(-9,54-8,32)	5,2(-21,08-13,58)	0,023

#= independent t test After independent t test analysis on the above variables are done, the result is by providing education and high calories high protein intake will increased energy, protein intake and nitrogen balance.

Hospital Padang, Sardjito General Hospital stated that patients with inadequate protein intake had a 1,5-times greater risk of malnutrition than patients with sufficient protein intake (Dwiyanti.,2004).

The tendency of muscle loss in cancer has been reviewed by other researchers with the conclusion that many factors affecting such as age, physical activity and metabolism of cancer-related proteins also affect skeletal muscle. The drugs commonly used for chemotherapy also cause negative nitrogen balance (Geirsdottir., 2008).

There is an increased intake of energy, protein and nitrogen balance after being treated with supplemental diet, but decrease in UUN value. Adequate protein intake is important for wound healing, protein synthesis and activating immune cells. Witenaar et al found that patients with high calories high protein intake will lost less body weight and muscle mass, while increased muscle mass after supplemental intake.

In this study obtained positive nitrogen balance caused by body energy savings, body protein mass, the ratio of protein source in the diet. To ensure a depleted positive nitrogen balance is recommended to provide an approximate amount of calories near the estimated energy requirement (Alpers dkk, 2008).

Cheraskin (2005) studied dietary effects on response of cervical carcinoma to radiation. In the research that is with the provision of high protein low fat diet compared with standard nutritional support. There was a significantly higher response in the group with a sustained high protein diet. In addition, the radiation response in the control group worsened at an advanced stage, whereas the high-protein diet group continued to respond well to the therapy.

Protein-calorie malnutrition occurs in most of cancer patients. The degree of imbalance between synthesis and catabolism depends on the level of nutrient depletion, the total body protein mass, the protein turnover and the changes produced by cancer cells. In Terepka and Waterhouse research (2005) have questioned the benefits and side effects of "forced feeding". It may be effective if run for short term, whlie this therapy can not be maintained for long periods. Giveing peroral intake for 10 days will resulting in a positive nitrogen balance.however, in the post supplemental periods it will returns to the equilibrium point and eventually becomes negatives. Nutrition support programs should be performed on outpatients so that patients will stay in the "feeding" phase. Regular monitoring and counseling as well as individual changes in feeding regimens to change behavioral patterns and taste sensation are the very important thing.

Increased protein levels after education and supplementation led to increased the nitrogen balance value. This is due to the use of protein as one of the muscle formation. The nitrogen released less causing increased nitrogen balance. Decreased of glomerulus filtration rate because decreased creatinin excretion rate also causing accumulation of creatinin in body fluid and increased concentration in the plasma. Adequate protein intake in the diet will promote nitrogen balance, but because decreased renal excretion, nitrogen waste will be increased.

When too little protein in the diet is given, the reserve protein catabolism will increased. When this situation continues will disrupt patient nutritional status which will lead to malnutrition (Roesli.,2005).

### CONCLUSIONS

In this study it can be concluded that with high calories high protein intake could increase nitrogen balance in end stage nasopharyngeal carcinoma.

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