

*Originalni članci/
Original articles*

PREOPERATIVE EVALUATION OF
NUTRITIONAL STATUS OF GASTRIC
CANCER PATIENTS: A PILOT STUDY

PREOPERATIVNA PROCENA
ISHRANJENOSTI OBOLELIH OD RAKA
ŽELUCA: PILOT STUDIJA

Correspondence to:

Mr sc. dr **Konstansa K. Lazarević**
Dr Milenka Hadžića 2/23
18000 Nis, Serbia
Tel: 064 1409376

E-mail: koni33@hotmail.com

Konstansa Lazarević¹, Nagorni Aleksandar^{2,3},
Mihail Kochubovski⁴

¹ Institute of Public Health, Niš, Serbia

² Gastroenterology and hepatology Clinic, Clinical Center Nis, Serbia

³ School of Medicine, University of Nis, Serbia

⁴ Institute of Public Health of the Republic of Macedonia, Skopje, Republic of Macedonia

Key words

gastric cancer, malnutrition,

Ključne reči

rak želuca, pothranjenost

Abstract

The purpose of this paper is to determine the pre-operative nutritional status of gastric cancer patients and also the best method from evaluation of nutritional status.

The research included 51 people with histologically confirmed diagnosis of gastric cancer, hospitalized in Clinical Centre Niš (Serbia) in the period from 2005 to 2006. The evaluation of their nutritional status was performed through body mass index (BMI), nutrition risk index (NRI), of Patient Generated Subjective Global Assessment (PG-SGA), preoperative loss of body mass (%) and the evaluation also included total protein, hemoglobin and albumin serum values. Based on body mass index, 11 (21.6%) patients were estimated as malnourished. The number of malnourished patients was 36 (70.6%) when it was assessed by NRI. PG-SGA established that 34 (66.7%) of patients are malnourished, while 17 (33.3%) are well nourished. Preoperative loss of body mass was 7.6-30.2% (average 18.5%). The lowered albumin values were registered in 29 (56.9%) patients, while anemia (lower hemoglobin values) was seen in 34 (66.7%) patients.

In our study PG-SGA and serum albumin value were the best indicator of malnutrition and risk of malnutrition. The development and use of nutritional screening (PG-SGA especially) mandatory in admission of gastric cancer patients in hospital, is essential for early nutritional intervention because significant percentage of gastric carcinoma patients is malnourished.

INTRODUCTION

The data from the literature indicate that 20 - 60% of patients manifest some degree of malnutrition during hospitalization⁽¹⁾. Malnutrition increases the risk for infections, respiratory and cardiac arrest and slows the healing of wounds.⁽²⁾ It is very often present in cancer patients^(3,4) and it increases the risk for postoperative complications⁽⁵⁻⁷⁾.

The most common method used to assess nutritional status of gastric patients in our Surgery clinic are biochemical parameters such as serum total protein and serum hemoglobin levels. Even simple methods such as determining body weight and body mass index are not performed. The use of validated nutrition screening and assessment in clinical practice is fundamental for effective early nutritional support.

The purpose of this paper is to present preoperative nutritional status of gastric cancer patients (in order to point out the significance of its mandatory determining in the clinical practice), and to propose the best method from evaluation of nutritional status.

METHOD

The research included 51 persons (33 males and 18 females) with first-time histologically verified diagnosis of gastric adenocarcinoma. The patients were hospitalized in Surgery Clinic of Clinical Center Nis in the period from January 2005 to December 2006.

In our study, the evaluation of nutritional status was conducted on admission to the clinic by physicians who determined: body mass index (BMI), nutrition risk index (NRI)

and used authorized questionnaire of Patient Generated Subjective Global Assessment (PG-SGA).

Body weight (expressed in kg) was measured by calibrated medical decimal scales, while the height (expressed in cm) was measured by antropometer. Body mass index (BMI) was determined as body mass expressed in kg and the square of height expressed in m² (kg/m²). Based on information about the previous body mass (received from patients) the percentage of body mass loss (%) was calculated for the period of 6 months.

The persons who were considered malnourished had BMI<18kg/m² and the loss of body mass greater than 10%.

Buzby nutrition risk index (NRI) was calculated by the formula:

$$NRI=1.519+alb (g/l)+ 0,417 X (\text{usual BW (kg)}/\text{present BW (kg)} X 100$$

Calculated values > 100 indicate good nutritional state, 97.5-100 mild malnourishment, 83.5 to < 97.5 moderate malnourishment and < 83,5 severe malnourished.

In order to assess nutritional status for this paper, we used PG-SGP procedure (*Patient Generated Subjective global Assessment*)⁽⁸⁾. It is based on the anamnesis of weight loss and food intake, evaluation of general condition, metabolic stress, presence of gastrointestinal symptoms, as well as on subjective ranking of muscle degradation, edema presence and the loss of subcutaneous fat tissue.

The PG-SGA is specifically designed to assess cancer patients and provides a global rating of A (well-nourished), B (at risk of malnutrition) or C (malnourished) in addition to a nutritional score.

In the evaluation of the nutritional status, we used values of some biochemical parameters: hemoglobin, total protein, albumin, urea, and creatinin from patients' histories. Descriptive statistics of mean, standard deviation and frequency were used.

RESULTS

Basic characteristics of the subjects are shown in the table 1.

Table 1. Basic characteristics of the subjects

| Characteristics | Value | Rank |
|----------------------------------|------------|----------|
| Age (x±sd) | 65,7±9,9 | 45-65 |
| < 65 | 22 (43.1%) | |
| >65 | 29 (56.9%) | |
| Median | 67 | |
| Body mass index (x±sd) | 21.1±3.3 | 15.8-30 |
| Median | 20.1 | |
| Percentage of body mass loss (%) | 18.5 | 7.6-30.2 |
| >10 | 43 (84.3) | |
| Median | 17.5 | |
| Loss of appetite (%) | 96 | |

From table 1 we can see that the subjects were elderly (Me-67). Averagely patients had lost in the last 6 months a substantial percentage of body mass (18.5 %) and even 84,3% had body mass loss greater than 10%. The loss of appetite was present in 48 (96%) patients.

The values of biochemical parameters of nutrition are shown in Table 2.

Table 2. Values of subjects' basic biochemical parameters

| Parameter | Value | Rank |
|-----------------------|------------|--------|
| Hemoglobin (x±sd) | 99.8±26.5 | 42-150 |
| Me | 101 | |
| <110 g/l (n %) | 34 (66.7) | |
| Total proteins (x±sd) | 60.3±7.1 | 44-72 |
| Me | 61 | |
| < 63 g/l (n %) | 33 (64.7) | |
| Albumins (x±sd) | 32.9±6.1 | 20-46 |
| Me | 33.2 | |
| < 35 g/l (n %) | 29(56,9) | |
| Creatinin(x±sd) | 84.7±20.2 | 53-137 |
| Me | 81 | |
| > 115 mmol/l (n %) | 5 (9.8) | |
| Urea (x±sd) | 6.8±2.9 | 2.5-19 |
| Me | 6.9 | |
| > 7.5 mmol/l (n %) | -20 (39,2) | |

More than a half of our patients were anemic (66.7%), had lower values of total proteins (64.7%) and albumins (56.9%). Every tenth patient had higher creatinin values while 40% of them had higher urea values.

Based on body mass index, 11 (21.6%) patients were assessed as malnourished (BMI< 18 kg/m²) more than half or 34 (66.7%) patients were assessed as subjects with normally nutritional status (BMI-18-24.9 kg/m²), while 6 (11.7%) patients were overweight (25<BMI<30 kg/m²).

Malnourished patients made 70.6% of the group, and 33.3% were severely malnourished and 37.3% moderately malnourished when malnutrition is evaluated by nutritional risk index (NRI). Only 29.4% of patients had good nutritional status (table 3).

Table 3. Categorization of nutritional status

| Method | Obesity/over eight | Well nourished | Malnutrition or risk of malnutrition |
|--------|--------------------|----------------|--------------------------------------|
| BMI | 6 (11,7) | 34 (66,7) | 11 (21,6) |
| NRI | - | 15 (29,4) | 36 (70,6) |
| PG-SGA | - | 17 (33,3) | 34 (66,7) |

Similar results were received when the evaluation of nutritional status was done by PG-SGA. This questionnaire established that 16 (31.4%) of patients are severely malnourished 18 (35.3%) moderately malnourished while 17 (33.3%) are well nourished.

DISCUSSION

The positive association between preoperative weight loss and postoperative mortality after gastric resection was observed back in the thirties of the last century⁽⁹⁾. According to information from American Surgical Association, out of 18365 gastric cancer patients, 61.6% had a significant preoperative loss of body mass⁽¹⁰⁾.

In the study conducted in 2000 and 2001 in Surgery Clinic in Nis (Serbia), the loss of body mass was confirmed

by 88%, while loss of appetite was confirmed in 95% gastric cancer patients (11). Five years later, patients in our research also were mostly older people with significant weight loss in the last 6 months, and nutritional screening was not mandatory yet. It is evidenced that preoperative loss of body mass in gastric cancer patients is in positive correlation with postoperative mortality (12,13). Obesity is generally less present in gastric cancer patients compared to healthy controls (14-16).

In our research almost every fifth patient was malnourished (if we use body mass index for evaluation). In the research of Murphey et al. (17), this percentage was a lot lower and was 8%. Body mass index (BMI) lower than 20 has a negative influence on survival of patients with the advanced gastric cancer (18).

A large number of subjects had increased creatinin and urea values in bloodstream so that there is a possibility that renal function is compromised and consequently fluid retention is a possibility. Fluid retention can be caused by use of certain medicaments (for example, corticosteroids) (19, 20). This is the reason why body mass index cannot be used for evaluation of nutritional status.

That malnutrition is present in our study is also indicated by lower values of total proteins, most of all albumins. The values of serum proteins, especially albumin can be lower in liver diseases, in chronic and acute inflammations so they cannot be used separately for evaluation of nutritional status. Hipoalbuminemia is in gastric cancer patients, in direct positive connection with postoperative mortality (13), and low preoperative level of serum proteins with the development of operative complications (6).

Kim et al (21) noticed lower rate of survival in gastric cancer patients who had hemoglobin level lower than 12mg/l on admission, as well as in patients who had albumin

level lower than 3.5mg/l. Lower values of albumin and hemoglobin were seen in significant number of patients in our study.

It is understandable that tests created by combination of several nutritional parameters such as NRI and PG-SGA show the best sensitivity for the evaluation of nutritional status. Severe malnutrition classified according to NRI is in positive connection with high rate of post-operative mortality in gastric cancer patients (13).

In 1984 it was proven that subjective global assessment method-SGA (22) has high sensitivity in evaluation of nutritional status compared to other methods. This procedure was modified in beginning of the nineties for oncological patients (PG-SGA) and its validity was proven (23).

Yoon et al. recommend SGA as adequate method for evaluation of nutritional status of gastric carcinoma patients (24). This can be easily understood if we take into account that this authorized questionnaire, apart from body mass loss and evaluation of general condition, when evaluation nutritional status also considers the use of corticosteroids and the presence of edemas. Preoperative nutritional support has proven to be effective in prevention of development of operative complications and post-operative mortality in gastrointestinal carcinoma patients (25, 26).

In our study PG-SGA and serum albumin value were the best indicator of malnutrition and risk of malnutrition. They should be used in evaluation of nutritional status.

The results of our study indicate that a significant percentage of gastric carcinoma patients are malnourished. Since the results of numerous studies indicate that malnutrition increases the risk for postoperative mortality, better screening is needed, as well as to design programs to prevent and control malnutrition with nutritional support.

Apstrakt

Cilj ovog rada je da utvrdi preoperativnu ishranjenost obolelih od raka želuca, i predloži najbolju metodu za ocenu ishranjenosti.

U istraživanje je uključena 51 osoba sa histološki potvrđenom dijagnozom raka želuca, hospitalizovana u Kliničkom centru Niš, u periodu od 2005-2007. god. Ocena ishranjenosti sprovedena je određivanjem indeksa telesne mase (BMI), nutritivnog indeksa rizika (NRI), upitnika PG-SGA (Patient Generated Subjective Global Assessment), preoperativnog gubitka telesne mase (%), i određivanjem vrednosti ukupnih proteina, hemoglobina i albumina u serumu.

Na osnovu indeksa telesne mase, 11 (21.6%) pacijenata bilo je pothranjeno. Pothranjenih pacijenata bilo je 36 (70.6%) kada je procena vršena pomoću NRI. Upitnikom PG-SGA utvrđeno je da je 34 (66.7%) pothranjeno, a 17 (33.3%) imalo je dobru ishranjenost. Preoperativni gubitak telesne mase kretao se od 7.6-30.2% (prosečno 18.5%). Snižene vrednosti albumina zabeležene su kod 29 (56.9%) pacijenata, a anemična (snižene vrednosti hemoglobina) su bila 34 (66.7%) pacijenta.

U našem istraživanju PG-SGA i vrednosti serumskih albumina, bili su najbolji indikatori pothranjenosti i rizika od pothranjenosti. Obavezan skrining ishranjenosti (pomoću PG-SGA) prilikom hospitalizacije obolelih, kao i primena odgovarajuće nutritivne terapije su neophodni, jer je veliki deo obolelih od raka želuca pothranjen.

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