DE GRUYTER OPEN

Short Communication

DOI: 10.1515/rrlm-2015-0011

Assessment of preoperative and postoperative prealbumin in thoracic surgery – a two months experience in a Romanian university hospital

Evaluarea preoperatorie şi postoperatorie a prealbuminei în chirurgia toracică - experiența de 2 luni a unui spital universitar din România

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Abstract

Malnutrition is a frequent and serious finding in surgical departments. Although its consequences include postoperative complications and higher costs, nutritional assessment is not part of the routine preoperative protocols. Nutritional assessment involves clinical and biological parameters and is vital in order to start treatment and improve outcome. Prealbumin is currently recognized as a faithful marker of malnutrition being introduced in practice guidelines. One of the most important aspects about prealbumin is the fact that its variations in time are more valuable than the absolute values. The aim of this study was to assess and compare the perioperative nutritional evolution of patients requiring thoracic surgery, with and without cancer, using prealbumin - preoperative and postoperative - as main marker. Thirty six patients from the Thoracic Surgery Department were assessed prior to surgery by body mass index, Subjective Global Assessment nutrition risk score and routine biochemical parameters. Prealbumin was assessed prior to surgery and 3 days after surgery. The age, length of postoperative stay and the presence was complications was noted. Patients with cancer (n=19) were significantly older than patients without cancer (p=0.007) and were more frequently, but not significantly, evaluated as malnourished through SGA (42.1% compared to 11.6%). Preoperative prealbumin and other parameters did not differ significantly between groups. However, there was a significant postoperative decrease in prealbumin only in patients with cancer. Therefore, prealbumin has been found to be valuable in assessing acute malnutrition in cancer patients, especially if variations are monitored in time, which could be useful in planning nutritional treatment.

***Keywords**: prealbumin, malnutrition, thoracic surgery*

Rezumat

Malnutriția este o constatare frecventă și importantă în secțiile chirurgicale. Deşi consecințele sale includ complicații postoperatorii și costuri mai mari, evaluarea nutrițională nu face parte din protocoalele preoperatorii de rutină. Evaluarea nutriţională include parametri clinici și biologici și este vitală pentru a începe tratamentul și

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a îmbunătăți rezultatele. Prealbumina este în prezent recunoscută ca un marker fidel al malnutriției şi este inclusă în ghidurile de practică. Unul dintre cele mai importante aspecte legate de prealbumină este faptul că variațiile sale în timp sunt mai valoroase decât valorile absolute. Scopul acestui studiu a fost de a evalua și compara evoluția nutrițională perioperatorie a pacienţilor care necesită intervenţii de chirurgie toracică, cu şi fără cancer, folosind prealbumina - preoperator și postoperator - ca marker principal. Treizeci şi şase de pacienţi de la Clinica de Chirurgie Toracică au fost evaluaţi înainte de intervenţia chirurgicală, prin indicele de masă corporală, scorul de risc nutriţional Subjective Global Assessment (SGA) și parametri biochimici de rutină. Prealbumina a fost evaluată înainte de intervenţia chirurgicală şi la 3 zile după operaţie.Vârstă, durata spitalizării postoperatorii și prezența complicaţiilor au fost notate. Pacienții cu cancer (n = 19) au fost semnificativ mai în vârstă decât pacienții fără cancer (p = 0,007) și au fost mai frecvent, dar nu în mod semnificativ, evaluaţi prin SGA ca fiind malnutriţi (42,1% față de 11,6%). Prealbumina preoperator și alți parametri nu diferă semnificativ între grupuri. Cu toate acestea, a existat o scădere semnificativă a prealbuminei postoperator doar la pacienții cu cancer. Prin urmare, prealbumina s-a dovedit a fi valoroasă în evaluarea malnutriţiei acute la pacienţii cu cancer, în special prin monitorizarea variaţiilor în timp, ceea ce ar putea fi util în planificarea tratamentului nutriţional.

***Cuvinte cheie**: prealbumină, malnutriție, chirurgie toracică*

Received: 10th August 2014; Accepted: 1st March 2015; Published: 8th March 2015

Introduction

Malnutrition is a common problem in hospitalized patients, being found in almost 50 % of those undergoing surgery. The 2010 US nationally-representative data describing hospital discharges showed that patients who had the diagnosis of malnutrition were older, with more related diseases, spent more time in hospital, at higher costs and with higher mortality rates (1). Although the consequences of malnutrition are serious in regards to surgical outcome, nutritional assessment is not routinely included in perioperative protocols. Moreover, there is no "gold standard" in defining malnutrition and a variety of clinical and biological methods can be used. However, if diagnosed, treatment of malnutrition is proved to lead to better short- and long-term outcome (2).

Many different surgical fields reported that malnutrition and its complications were highly prevalent. These include orthopaedics, abdominal surgery, head and neck surgery, neurosurgery, where poor nutritional status leads to a higher risk of infection, increased rate of failure of surgery or worsen the long-term outcome. The methods used for detecting patients at risk included serologic parameters, especially the use of prealbumin, clinical measurements, including hand-grip or nutritional risk scores (3-7).

Malnutrition represents a particular issue for cancer patients and for those admitted in intensive care units. The prevalence of malnutrition was found to be high, about 60%, in a large Korean study on more than 12000 cancer patients. The authors also proved that malnutrition was more frequent in patients with advanced stages of the disease, in those with liver cancer (86.6 %) and in those with longer hospital stay (8). Total serum protein and total iron-binding capacity were found to independently predict the risk of postoperative sepsis in cancer patients (9). In colorectal cancer patients, on admission to hospital, 20% were malnourished, although half of them were overweight or obese (10). A review of the literature up to 2006 showed that malnutrition in acute care patients ranged from 13-78% and continued to be a serious problem, contributing to increased hospital costs and use of resources. Out of the different methods for detecting nutrition which were investigated, Subjective Global Assessment (SGA) was found to be the tool with the most diagnostic value in acute care patients (11).

Among the different means for assessing nutritional status, the use of prealbumin is believed by many authors to be the most specific one. Prealbumin, a protein produced by the liver, metabolized and excreted by the kidneys, has a short half-life (1.9 days). Its serum levels undergo rapid changes in relation to the nutritional status. It is also called transthyretin (TTR) (thyroxin and retinol transporter), because it is a carrier of thyroxin and retinol in serum and cerebrospinal fluid. The vast majority of transthyretin remains free (12). Despite the similarity between names - “prealbumin” and “albumin” – the two are not biochemically related, neither being the precursor of the other. In fact, the term “prealbumin” is used because it migrates faster than albumin in the electrophoresis gel. There is solid proof that prealbumin is a good measure of nutritional status among acute or chronic patients and among critically ill; therefore, it has been widely used to foresee outcomes such as duration of hospitalization, development of infections, and even mortality (13). Prealbumin has been also used for pre-surgical risk stratification and in predicting post-surgical outcome (14,15). In outpatients, only for artificially fed patients, prealbumin was the best predictor of prognosis together with comorbidities (16). Dieticians regularly use prealbumin levels in assessing the nutritional needs of hospitalized patients especially the critically ill. Prealbumin is currently recognized as a faithful marker of malnutrition being introduced in practice guidelines (17). One of the most important aspects about prealbumin is the fact that its variations in time are more valuable than the absolute values (2).

The available data regarding malnutrition in thoracic surgery units is contradictory. In an older study on thoracic surgical patients, malnutrition was found in almost a half of the 102 patients studied, especially in those with empyema and those with oesophageal cancer (18). In a study on patients with lung cancer scheduled for pneumonectomy, based on the prealbumin levels, almost a third were malnourished, and malnutrition, together with smoking and extended resection were predictive factors for postoperative complications (19). However, in another study, severe malnutrition, defined as low prealbumin levels, was found to be uncommon, in patients undergoing lung cancer operations, specifically found in 11.9 % of the patients (20). Another study found that patients with tuberculosis were more frequently suffering from low serum prealbumin which could even be used to monitor the therapeutic effects of tuberculosis drugs (21).

The aim of this study was to assess and compare the perioperative nutritional evolution of patients requiring thoracic surgery, with and without cancer, using prealbumin - preoperative and postoperative - as main marker. To our knowledge, this direct comparison has never been done before.

Material and methods

We performed a prospective study in the Thoracic Surgery Department of the Clinical Pneumology Hospital, Iaşi, Romania. Patients were enrolled consecutively during August-September 2011. We used patients’ medical charts to extract demographic data (age, sex), the main diagnosis (the diagnosis of cancer had the pathological confirmation), the postoperative length of stay (LOS) and the presence of postoperative complications. The same investigator evaluated the anthropometric parameters - height and weight – one day prior to surgery; height was measured using a stadiometer to the nearest 0.1 m (Practical metrology, Lancing, UK) and weight was recorded in the morning, before meal, to the nearest 0.1 kg, using calibrated medical portable scales with 4 sensors (27236 model, Liamed, Braşov, Romania). With these data we calculated body mass index (BMI) as weight (kg) over height^2 (m^2). According to the World

Health Organisation, subjects were classified as underweight if BMI was <18.5 kg/m2. All patients were evaluated by the same investigator using the SGA, a nutritional risk score taking into consideration recent weight loss, dietary intake and gastrointestinal symptoms, physical signs of malnutrition and functional capacity, as described by Destsky et al. (22). According to SGA, patients were then classified as being well-nourished, moderately or suspected of being malnourished and severely malnourished.

We obtained fasting peripheral venous blood samples from the patients, on the day of surgical intervention and 3 days after the surgery. Prior to surgery, we analysed: haemoglobin (Hb), total lymphocyte count (TLC), white blood cells (WBC) count, erythrocyte sedimentation rate (ESR), fibrinogen, C-reactive protein (CRP), total protein level, glucose, aspartate aminotransferase (ASAT) and alanine aminotransferase (ALAT), urea and creatinine. For these parameters, we used the hospital lab and the standard means of analysis. For the haematology tests, the Sysmex XS-1000i Automated Hematology Analyzer was used, with the following principles and technologies: Non-cyanide, Sodium Lauryl Sulfate for Hb and Fluorescent Flow Cytometry for WBC and TLC. The ESR was measured using the Westergren method. The clinical chemistry tests (total protein, glucose, ALAT, ASAT, urea and creatinine) were performed by absorbance photometry using a COBAS INTEGRA® 400 plus analyzer; on the same analyser, CRP was assessed by turbidimetry. The assay used for measuring fibrinogen levels in plasma was the Clauss method. Prealbumin was the only parameter assessed prior to surgery and after surgery, using a separate blood sample. For this marker, the samples were centrifuged 20 minutes after collection, and then the serum was kept at -18°C until all probes were collected (not more than 30 days) and analysed. Prealbumin was determined by immunoturbidimetric assay: human prealbumin forms a precipitate with a specific antiserum which is determined turbidimetrically – anti-prealbumin T antiserum (rabbit) specific for human prealbumin was used.

The study had the approval of the Ethics Committee of the Clinical Pneumology Hospital and was conducted in accordance with the Helsinki Declaration; all patients signed an informed consent form before being enrolled.

We used the Statistical Package for the Social Sciences (SPSS) for Windows 17.0 software package (SPSS, Chicago, USA) for statistical data analysis. Continuous variables with normal distribution are presented as mean ± SD and 95% confidence interval (variables without a normal distribution are also presented with median and ranges). Categorical data are presented as number (n) and percentage. We used $\chi 2$ test to compare categorical data. We evaluated differences among the two study groups with Student's t test, if the variables were normally distributed, and using Mann-Whitney non-parametric test, if the variables were not normally distributed (we used the Shapiro-Wilk test as our numerical means of assessing normality). Statistical significance was set at P<0.05.

Results

We enrolled 36 patients (19 men, 17 women) in this study. The average age of patients was 55.4±17.2 years, without significant difference between men and women (p>0.05). Nineteen patients (52.8%) had the diagnosis of cancer; the others were mainly admitted for infection or trauma. The average LOS was 7.4±4.1 days and 5 patients (13.9%) developed postoperative complications. The LOS of patients who developed complications was 13.2±6.3 days, which was significantly longer than that of patients who did not develop complications, of 6.4±2.6 days (p=0.006). The average BMI of patients was 22.4±5.1 kg/m^2, and 4 patients (11.1%) had a BMI<18.5 kg/m^2. According to the SGA score, 72.2% of patients were well-nourished, 19.4% were moderately malnourished and 8.3% were severely malnourished. We did not find any significant differences in any of these parameters between men and women. The laboratory findings are presented in Table I, which also shows the lack of significant difference of these parameters between men and women, except for TLC and ASAT.

We found a statistically significant postoperative decrease in prealbumin (p=0.001). When

Table I. Laboratory characteristics of study subjects

	Total (n=36)	Men (n=27)	Women (n=9)	*p*
TTR before surgery (mg/dl)*	20.2±8.2 (17.5 – 23)	20.9±8.6 (17.5 - 24.3)	18.2±6.9 (13 - 23.6)	>0.05**
TTR after surgery (mg/dl) †	15.8±8.9 (12.8 - 18.9) 12.99; 43.45	15.9±7.6 (13 – 19) 13.1; 26.4	15.6±12.6 (6 - 25.3); 11.34; 38.06	>0.05††
Hb (g/dl)*	12.6±1.9 (11.9 - 13.2)	12.7±1.9 (12 - 13.5)	12.1±1.8 (10.6 - 13.5)	>0.05**
TLC (cells/mm^3)*	1530±558 (1335 - 1725)	1639±569 (1409 - 1868)	1178±355 (881 - 1474)	0.039**
WBC (cells/mm^3) †	8612±3822 (7299 – 9925); 7605; 15920	9270±3682 (7783 - 10757); 7750; 14730	6712±3775 (3811 – 9614); 6760; 6640	>0.05††
ESR (mm/1h) †	53.5±42.6 (38.4 - 68.6); 47; 145	51.3±40.9 (34.4 - 68.2); 46; 138	60.4±49.9 (18.7 - 102.1); 52; 145	>0.05††
CRP (mg/l) †	18.6±20.4 (11.1 - 26.1); 12; 48	19.3±20.4 (10.6 - 27.9); 12; 48	16.3±21.8 (3.9 - 36.5); 6; 48	>0.05††
Fibrinogen (g/l)*	3.7±1.6 (3 - 4.4)	3.5±1.2 (2.9 - 4.1)	4.1±2.3 (1.8 - 6.5)	>0.05**
TP (g/l)*	82.3±7.3 (79.7 - 84.8)	83±6.6 (80.3 - 85.8)	80.1±9 (73.2 - 87.1)	>0.05**
Glucose (mg/dl)*	105.1±41.7 (90.4 - 119.9)	107.5±47.4 (87.9 - 127.1)	97.8±13 (86.9 - 108.7)	>0.05**
ASAT (U/l) †	29.5±25.3 (20.7 - 38.4); 20; 88.6	22.8±12.3 (17.7 - 27.9); 18.7; 49	48.2±40.7 (16.9 - 79.5); 25.4; 81.1	0.037††
ALAT (U/l) †	29.5±28.7 (19.5 - 39.5); 19.5; 125.6	24.8±26.2 (14 - 35.6); 17.4; 125.6	42.7±32.7 (17.6 - 67.8); 22.6; 88	0.035††
Creatinine (mg/dl)*	0.75±0.35 (0.63 - 0.88)	0.79±0.37 (0.64 - 0.95)	0.64±0.27 (0.44 - 0.85)	>0.05**
Urea (mg/dl)*	36.4±22.8 (28.5 - 44.4)	38.1±24.3 (28.1 - 48.2)	31.8±18.1 (17.9 - 45.7)	>0.05**

*Values are presented as mean±SD and 95% confidence intervals.
***p* value for t-student with gender.
†Values are presented as mean±SD and 95% confidence intervals; median; range.
††*P* value for Mann-Whitney non-parametric test with gender.

we separately evaluated the groups of patients with cancer and patients without cancer, we found that this significant decrease was maintained only in patients with cancer. The exact values and statistical significance are presented in Table II. The preoperative serum levels of prealbumin were not significantly different in patients with cancer, compared to patients without cancer (p>0.05), but postoperative, the prealbumin serum level was significantly lower in patients with cancer compared to patients without cancer (p=0.014).

The age of patients with cancer was significantly greater than that of patients without cancer, with an average of 63.5±9.4 years compared to 46.3±19.6 years (p=0.007). Also, a higher proportion of patients with cancer were moderately and severely malnourished according to SGA (31.6% and 10.5% respectively), compared with the population without cancer (5.8% moderately malnourished and 5.8% severely malnourished), but statistical significance was not obtained (p>0.05). The BMI of patients with cancer was not significantly different than the BMI of patients without cancer (p>0.05). There were no differences (p>0.05) between the two groups in the LOS or the percentage of patients who developed complications - 10.5% in the group of patients with cancer and 17.6% in the group of patients without cancer. There were no other significant differences between the two groups in the laboratory findings – inflammatory markers, hepatic or renal function – except for glucose, which was lower in the group of patients with cancer. The values of the laboratory parameters for the two groups and the statistical significance are presented in Table III.

Discussion

In our study, the main difference between patients with cancer and those without this pathology was the significantly lower postoperative level of prealbumin, although the preoperative levels were not significantly different. In patients with lung cancer, decreased prealbumin levels suggest not only acute malnutrition, but also a worse long time prognosis. One study assessed the perioperative nutritional status of these patients using serum levels of prealbumin (5 days before and 7 days after surgery) and correlated it with early recurrence of cancer. In patients who developed early recurrence, perioperative prealbumin serum levels were significantly lower than in patients without recurrence (p<0.05). In addition, patients with decreased prealbumin had a worse prognosis than patients with higher prealbumin (p<0.001). However, there was no correlation between serum prealbumin and pathological stage. By multivariate analysis, the authors showed that low perioperative serum prealbumin could be an independent prognostic factor of poor outcome (23). One limitation of our study was the impossibility to analyse the

Table II. The decrease in TTR after surgery*

	TTR before surgery (mg/dl)	TTR after surgery (mg/dl)	*p***
Total (n=36)	20.2±8.2 (17.5 – 23)	15.8±8.9 (12.8 - 18.9)	0.001
Patients with cancer (n=19)	18.8±7.5 (15.2 - 22.4)	12.5±5.9 (9.6 - 15.3)	<0.001
Patients without cancer (n=17)	21.9±8.9 (17.3 - 26.4)	19.6±10.3 (14.3 – 25)	>0.05

*Values are presented as mean±SD and 95% confidence intervals.
***p* value for paired t-student between groups.

Table III. Comparison of laboratory findings between groups of patients

	Patients with cancer (n=19)	Patients without cancer (n=17)	*p*
Hb (g/dl)*	12.9±1.9 (12 - 13.8)	12.2±1.8 (11.2 - 13.1)	>0.05**
TLC (cells/mm^3)*	1441±519 (1190 – 1691)	1643±602 (1310- 1977)	>0.05**
WBC (cells/mm^3) †	8597±4436 (6459 – 10735); 7488; 15920	8630±3082 (6988 – 10272); 7605; 10260	>0.05††
ESR (mm/1h) †	60±45.3 (38 – 82); 58; 136	44.7±38.4 (22.5 – 67); 44; 145	>0.05††
CRP (mg/l) †	24±22.7 (11.9 - 36.1); 18; 48	12.8±16.5 (3.7 – 22); 9; 48	>0.05††
Fibrinogen (g/l)*	3.9±1.1 (3.2 - 4.5)	3.4±2.2 (1.9 - 4.9)	>0.05**
TP (g/l)*	81.8±7.3 (78.2 - 85.5)	82.8±7.4 (78.8 - 86.7)	>0.05**
Glucose (mg/dl)*	92.2±9.9 (87.3 - 97.1)	120.7±58.1 (88.5 - 152.9)	0.006**
ASAT (U/l) †	29.1±21.2 (18.6 - 39.6); 23.7; 88.6	30±30 (14 – 46); 17.6; 45.7	>0.05††
ALAT (U/l) †	27.9±23.8 (16 - 39.7); 19.8; 98.1	31.4±34 (13.2 - 49.5); 17; 122.3	>0.05††
Creatinine (mg/dl)*	0.69±0.21 (0.58 - 0.8)	0.82±0.45 (0.58 - 1.07)	>0.05**
Urea (mg/dl)*	34.1±14.6 (26.8 - 41.3)	39.1±29.8 (23.2 – 55)	>0.05**

*Values are presented as mean±SD and 95% confidence intervals.
***p* value for t-student between groups.
†Values are presented as mean±SD and 95% confidence intervals; median; range.
††*p* value for Mann-Whitney non-parametric test between groups.

contribution of age in the difference in prealbumin levels between groups, due to the relatively small number of patients. However, we have no reasons to consider that age would influence the value of prealbumin, but rather that it is a contributing factor to malnutrition.

We based our findings not on absolute values of prealbumin, but rather on its variation in time. There is no consensus of what defines "low prealbumin" from which negative consequences could be experienced. It has been previously postulated that a level lower than 15 mg/dl, and certainly lower than 11 mg/dl, significantly increases the prognostic risk and requires nutritional intervention and monitoring of prealbumin levels (24). Other authors cite a serum level below 30 mg/dl as suggestive for malnutrition in patients undergoing haemodialysis (25), while a large study identified that prealbumin levels less than 20 mg/dl in dialysis patients were associated with a higher death rate even in patients with normal albumin levels (26). One study found that serum prealbumin level of ≤20 mg/dl was found to determine increased risk for postoperative infections and need for longer intubation time in patients undergoing cardiac surgery (27). In another study, the authors split their pattern of study in two groups: patients with preoperative prealbumin <23 mg/dl and post-operative prealbumin <15 mg/dl were included in the "low-prealbumin group", but it was argued that this lead to dichotomizing of a continuous variable which could have underestimated the difference in results between groups, because variability could have been included in each group (28). However, the small number of patients in that study (44 patients) did not allow a strategy of multiple linear regression and structural equation model, which was more suitable for this type of statistical analysis, but it was commented that nutritional status being critical, prealbumin remains important for the clinician who needs a simple and convenient parameter (29). Choosing a cut-off point for a continuous variable creates a reasonable debate about sensitivity and specificity (30), but in the case of prealbumin, the variability in time offers more clinical significance than absolute values.

One aspect highly debated in literature is the role of factors influencing serum prealbumin levels, especially the role of inflammation. Serum prealbumin was proved to be associated with short-term energy intake independently of inflammation and even in the presence of multiple-organ involvement (31). However, Johnson et al. have drawn attention on the fact that in many situations in which serum prealbumin levels are decreased, especially in acute phase response, due to inflammation, malignancy, trauma, the concentration of prealbumin correlates with severity of the underlying disease rather than with malnutrition itself (32). Without contradicting the need for nutritional support in these patients, the authors warn against failing to detect the other causes of decreased serum concentrations of prealbumin (32). In a subtle different approach, Beck et al. argue that prealbumin assesses the severity of illness resulting from malnutrition in patients with chronic conditions or critically ill (33). Although it is not clear whether transthyretin levels decrease in response to a deficit in total calorie intake or predominantly protein calorie deficit, the latter is assumed. Malnourished children from poor countries, when starting a nutritional treatment, start synthesizing prealbumin above reference rates within two days of protein supplementation and reach normal synthesis after 8 days. On the other hand, a recent study found similar levels of prealbumin in patients receiving <60% or >60% of their caloric needs and a strong correlation with improved levels of C-reactive protein, arguing that transthyretin correlates more with inflammation rather than with caloric or protein caloric coverage (34,35).

Transthyretin is sensitive to systemic inflammatory response syndrome (SIRS), and must be understood in the context of acute illness in order to be used effectively. It should be assessed together with the estimated lean mass, C-reactive protein, absolute number of lymphocytes, presence of neutrophils, and perhaps procalcitonin, but a therapeutic plan can also be made based on its value alone (36). A number of studies have shown that decreased transthyretin is independently associated with higher morbidity and mortality, independent of albumin or other clinical findings, like in end-stage renal disease patients receiving haemodialysis (37,38). On the other hand, several studies have argued that albumin is the key marker of mortality, rather than transthyretin (39-41). In this context of debate, our study shows that although patients with cancer and patients without cancer were similar with regard to preoperative inflammatory status and had similar hepatic, renal and glucose metabolism status, prealbumin decreased significantly postoperative only in cancer patients, suggesting that prealbumin is a reliable parameter for assessing malnutrition, without being influenced by other factors.

In assessing malnutrition, a variety of risk score tools are currently used. The values of SGA, Patient-Generated Subjective Global Assessment and Nutritional Risk Screening 2002 were tested in a study on 45 non-critically ill patients on parenteral nutrition. The three nutritional tools correlated well with each other. Nutritional Risk Screening 2002 showed the best correlation with clinical and analytical variables, including albumin and prealbumin (42). However, for the patients in intensive care units, to use only SGA or even Nutrition Risk in Critically ill score could be inappropriate, as they would not uniformly identify patients as malnourished. Hence, it would be useful to include physical assessment and functional tests to better predict nutrition risk in these patients (43). A Spanish study found that almost 63.3% of patients admitted to hospital were malnourished as assessed by SGA, but in the same time, another score, Instant Nutritional Assessment was the best single score to identify patients with/or at risk of malnutrition (44). In patients undergoing cardiopulmonary bypass, out of the five nutritional screening tools tested, only Malnutrition Universal Screening Tool and Mini-Nutritional Assessment could independently predict postoperative complications, but not SGA, Nutritional Risk Screening 2002 and Short Nutritional Assessment Questionnaire (45). The performance of prealbumin was compared with two other methods of identifying patients at nutritional risk, SGA and Prognostic Inflammatory and Nutritional Index score. Detailed Nutritional Assessment was used as the reference method of assessing malnutrition. In accordance with the reference method, 41% of subjects had mild malnutrition and 19% suffered from severe malnutrition. Prealbumin showed the best agreement with the standard method and a good profile of sensitivity and specificity, compared with SGA and Prognostic Inflammatory and Nutritional Index, and could be used as a practical and valid method of assessing malnutrition (46). In summary, several studies show the benefit of some nutritional risk score over others, but many suggest the combined use of these tools along with determining prealbumin levels, which is the reason why we also chose this approach in our study.

Conclusions

Malnutrition in the Thoracic Surgery department, as assessed by SGA, was much more frequent in patients with cancer, who were also significantly older, compared to the other test subjects. Although the two groups of patients did not differ in terms of inflammation, hepatic or renal function or in terms of preoperative prealbumin level, a significantly lower level of postoperative prealbumin was observed in cancer patients. Prealbumin is valuable in assessing acute malnutrition especially if its variations are monitored in time, process useful in planning nutritional treatment.

Abbreviations

ALAT = alanine aminotransferase
ASAT = aspartate aminotransferase
BMI = body mass index
CRP = C-reactive protein
ESR = erythrocyte sedimentation rate
Hb = haemoglobin
LOS = length of stay
SGA = Subjective Global Assessment
SPSS = Statistical Package for the Social Sciences
TLC = total lymphocyte count
TTR = transthyretin
WBC = white blood cells

Conflict of interest

We declare no conflict of interest and no sources of funding.

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