Coll. Antropol. **31** (2007) 2: 435–439
Original scientific paper

Nutritional Risk Screening in Hospitalized and Haemodialysis Patients

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A B S T R A C T

Malnutrition is an independent risk factor impacting on higher complications and increased length of hospital stay and costs. The aim of this study was to determine the prevalence of nutritional risk among patients on regular haemodialysis (HD) (Group I, N=105) and among the patients at Gastroenterology, Endocrinology, Hematology and Clinical Immunology (Group II, N=652). Cross-sectional nutritional evaluation was done using Nottingham Hospital Screening Tool (NS). The prevalence of nutritional risk was 9% in Group I and 21% in Group II (p=0.0002). We found statistically significant larger quantity of malnourished patients among acute internistic patients than among chronic from the same Group II. Malnutrition among patients on HD didn't differ statistically to chronic internistic patients. We didn't found a significantly higher percentage of nutritional risk among elderly patients (65 years and more). Correlation between body mass index (BMI) and NS was significant, but weak (r=–0.32). We can conclude that the prevalence of nutritional risk among HD patients was lower than we had expected. It seems that the screening tool we used is not sensitive enough for HD patients and needs further investigations.

Key words: *nutritional risk, malnutrition, Nottingham screening tool, haemodialysis*

Introduction

Clinical nutrition is a fundamental component of general clinical care as well as acute and chronic disease management. Medical awareness of the patients' nutritional status still seems to be insufficient to current date all over Europe[1]. Malnutrition is an independent risk factor impacting on higher complications and increased morbidity, mortality, length of hospital stay and costs[2–4]. Of patients admitted to hospitals, 35–55% are malnourished on admission; 25–30% more become malnourished during stay. Approximately 50% of hospitalized patients are malnourished to some degree[5–8]. This percentage is even higher in the malignant and old age groups[9–12]. Malnutrition is a common complication among chronic haemodialysis (HD) patients. It has been suggested that there may be at least two fundamentally different types of malnutrition in patients with chronic renal insufficiency. The first is related to low protein and energy intake. The second type of malnutrition is associated with inflammation and cardiovascular disease[13]. The prevalence of malnutrition among HD patients is more than 50% [4,13–16]. Many evaluations of the nutritive status have been used, alone or in combination, to diagnose malnutrition. Some of the methods are too complex, costly and time consuming, or too specialized for implementation on a hospital-wide basis. There is no universally accepted definition of malnutrition. This are the reasons why diagnosis of malnutrition is usually based on the association of recent weight loss, inadequacy of dietary intake, low body mass index (BMI) and the presence of disease damaging nutritional status.

The aim of this study was to detect the prevalence of nutritional risk among patients being on chronic HD and among non-malignant internistic patient by using simple screening tool.

Received for publication March 14, 2003

Patients and Methods

Patients

Cross-sectional nutritional evaluation was done among 105 HD outpatients (Group I) and 652 consecutive internistic patients (Group II) at Clinical Hospital Centre Rijeka, Croatia. The number of patients, the distribution of age and gender of Group I and Group II are given in Table 1.

TABLE 1
DEMOGRAPHIC DATA OF THE PATIENTS

Parameters	Group I (N=105)	Group II (N=652)	Total (N=757)
Age (years)			
mean	63.5	60.7	61.1
SD	13.5	16.0	15.7
range	22–88	17–91	17–91
median	65	65	65
Gender			
male	49	349	398
female	56	303	359

N – number of patients, SD – standard deviation, $p<0.05$

Group I – HD patients

The patients were at least 6 months on HD and the mean time was 54 months (range 6–360). Standard dialysis treatment consisted of three weekly sessions (12 hours) using polysulfone membranes as well as bicarbonate dialysate. Lean body mass (LBM) was used for body mass index (BMI) calculation. Underlying renal diseases are listed in Table 2.

Group II – internistic patients

Patients at the departments of gastroenterology, hematology, endocrinology and clinical immunology participated in the study. All the patients were assessed within 48 hours after admission**.** Patients in Group II are divided to two subgroups: patients with acute disease and patients with chronic disease. The most frequent diagnoses are listed in Table 2.

Patients with malignant diseases, cirrhotic patients with oedema and disabled patients were excluded from the study.

Methods

Screening of the nutritional risk was done according to Nottingham Hospital Screening Tool (NS)[17]. The NS consisted of patient data (name, date of birth, sex, weight and height), ward, date, data on unintentionally lost weight over the last 3 months, food intake and severity of illness as a stress factor:

1. BMI value – weight (kg) divided by height squared (m),
   0 = greater than 20
   1 = 18–20
   2 = less than 18.

TABLE 2
THE MOST FREQUENT DIAGNOSES

Parameters	Number (%) of patients
Group I	
Diabetic nephropathy	27 (26)
Chronic glomerulonephritis	22 (21)
Chronic pyelonephritis	12 (11)
Nephrosclerosis	15 (14)
Polycystic disease of the kidney	9 (9)
Other	20 (19)
N	105 (100)
Group II	
Acute disease	
Upper gastrointestinal bleeding	87 (13)
Acute cholecystitis	85 (13)
Acute flare of inflammatory bowel disease	46 (7)
Acute pancreatitis	27 (4)
Acute metabolic disorders	12 (2)
Rectal bleeding-haematochezia	11 (2)
Other acute diseases	18 (3)
Chronic diseases	
Diabetes mellitus	65 (10)
Alcoholic cirrhosis	47 (7)
Disorders of connective tissue and joints	44 (7)
Anaemia and thrombocytopenia	43 (7)
Diverticular disease and polyps	34 (5)
Chronic pancreatitis	31 (5)
Cholelithiasis	27 (4)
Other	75 (11)
N	652 (100)

N – number of patients

2. Has the patient unintentionally lost weight over the last 3 months?
   0 = no
   1 = a little (up to 3 kg)
   2 = a lot (more than 3 kg).

3. Food intake – has this decreased over the last month prior to admission/estimation?
   0 = no
   1 = yes.

4. Stress factor/severity of illness?
   0 = none
   1 = moderate
   2 = severe

The gathered data were scored, and according to overall points, the patients were divided into three groups. If the score was 0–2 the patients didn't need nutritive support. The patients with score 3–4 had to be monitored

and reviewed in a week. Score ≥5 mean that the patients were malnourished and had to be referred to dietetic advice. Educated students of medicine school conducted the test.

Statistical evaluation of data was performed using Statistica 6.0, StatSoft. The differences were tested using Pearson's Chi-square, one-way ANOVA, Factorial ANOVA. Statistical significance level was at $p < 0.05$.

Results

In Table 1 are presented demographic data of the patients. Although the Group II of the patients appear to be younger on average, the difference with respect to the Group I patients was not statistically significant (one-way ANOVA, p=0.09). The gender distribution in the two groups didn't differ either (Pearson's Chi-square test, p=0.20), (Table 1).

We found 9 patients (9%) in Group I, and 140 (21%) in Group II with the value of NS score 5 and more. There were significantly more patients at nutritional risk in Group II than in Group I (Pearson's Chi-square test, p=0.0002), (Table 3). We analysed the NS values among the HD patients and chronic patients from the Group II, and there was no significant difference (Pearson's Chi-square test, p=0.06). Comparing acute and chronic patients within Group II we found more acute patients that were at malnutrition risk than among chronic patients (Pearson's Chi-square test, p=0.03), (Table 3). We divided HD patients into two groups according to the time being on HD: up to five years and five and more years. We didn't found statistically more patients at nutritional risk in the »five years plus« group (Kruskal-Wallis ANOVA test, p=0.49). According to age, we didn't found a significantly higher percentage of patients at nutritional risk among elderly patients (65 years and more), (Pearson's Chi-square test, p=0.49).

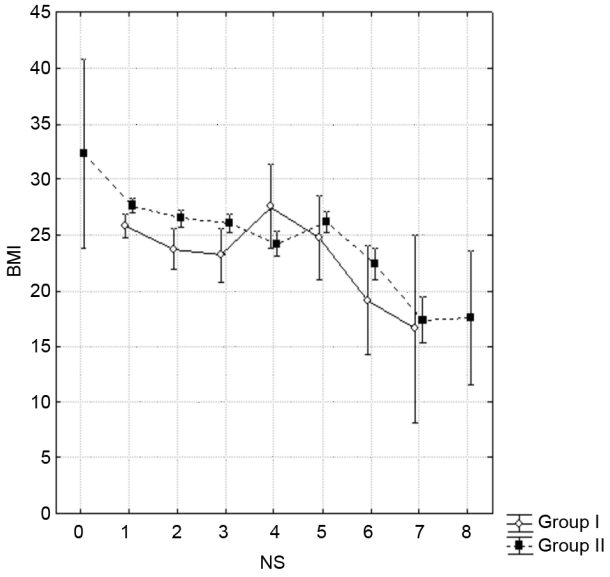

Fig. 1. BMI values (kg/m^2) for different NS values. Shown are the mean values and 95% confidence limits.

Analysing only the value of BMI, we found it significantly higher in Group II than in the Group I patients (one-way ANOVA, p=0.008), (Table 3). The values of BMI did correlate negatively with NS score, but although significant, the correlation was weak (r=–0.32, p<0.001). This was true for both Group I (r=–0.24, p=0.014) and Group II (r=–0.36, p<0.001).

Generally, values of BMI followed the same pattern of behaviour with NS score values in both groups (Factorial ANOVA, p=0.20). Although different NS values generally had well discriminated BMI values (one-way ANOVA, p<0.00001), the factor analysis by groups indicated the discrepancy with the expected behaviour in both groups. It occurred in Group I for the NS values 4 and 5, and in Group II for the NS value 5 (Figure 1).

TABLE 3
THE VALUES OF NOTTINGHAM HOSPITAL SCREENING TOOL (NS) SCORE AND BODY MASS INDEX (BMI) IN THE TWO GROUPS OF PATIENTS

Parameters	Group I	Group II			All groups
	Total	Acute diseases	Chronic diseases	Total	Total
N	105	286	366	652	757
BMI (kg/m^2)					
mean	24.9	25.9	27.7	26.2	26.0
SD	4.6	4.8	9.8	4.8	4.8
range	15.8–40.2	12.9–40.9	15.6–45.0	12.9–45.0	12.9–45.0
NS	N (%)				
0,1,2	79 (75)	125 (44)	226 (62)	351 (54)	430 (57)
3,4	17 (16)	89 (31)	72 (20)	161 (25)	178 (23)
≥5	9 (9)	72 (25)	68 (18)	140 (21)	149 (20)

N – number of patients, SD – standard deviation, p<0.05

Discussion

Our results showed the prevalence of nutritional risk of 9% among HD patients and 25% among acute internistic patients, respectively (Table 3), which was similar to German study on hospital malnutrition[18]. The prevalence of hospital malnutrition varied according to the criteria used to define it[19]. Difficulties arisen because there was no »gold standard« definition of malnutrition and hence no universally accepted criteria by which to measure it. Full nutritional assessment usually contains combination of clinical (history and anthropometry) and biochemical parameters. BMI is a simple tool, but some other anthropometric measurements, like midarm circumference (MAC) and triceps skin fold thickness (TSF), need skill staff and equipment. The presence of renal disease can confound several routine measures of nutritional status. Thus, it is necessary to carry out measures of protein status and body composition, as well as measures of nutritional intake, to identify the presence of malnutrition. Serum albumin, which is widely used to measure protein stores, may be altered by the coexistence of acute, catabolic illnesses, including underlying infection, which is common in dialysis patients[20,21].

The first step in providing optimum medical nutrition therapy to any population is nutritional risk screening. Much time and effort has been devoted to developing nutritional screening tools. Unfortunately, no one has yet defined the »universal tool«[17,21–23]. We used Nottingham Hospital Screening Tool (NS)[17] which contains all relevant points recommended by European Society for Parenteral and Enteral Nutrition (ESPEN)[22]. The obtained results, for internistic patients, were similar to the previously reported[6,19,25,26]. We found a statistically significant smaller number of patients at nutritional risk among HD patients comparing them with the internistic inpatients. That results weren't in accordance to results on prevalence of malnutrition among HD patients because that prevalence of malnutrition is one of the largest described[14,16,21]. When tested NS values among chronic and acute patients, we found significantly more patients that were at malnutrition risk that had acute disease. We found statistically significant larger quantity of malnourished patients among acute internistic patients than among chronic from the same Group II. Malnutrition among patients on HD didn't differ statistically to chronic internistic patients. When we divided HD patients into two groups according to the time-spend on HD we didn't found a significant difference between their nutritional risks. It can be due to their greater awareness of the disease. There were only a few diabetic patients in the »five year-plus« group, which couldn't explain this result. On the contrary, diabetic patients compared to non-diabetics are characterized by an increased incidence of protein malnutrition and decreased survival, but they show a significant increase in BMI in comparison with non-diabetics[27].

BMI is a simple anthropometric tool which can be universally used, and when is less than 20kg/m^2, it is admitted as a marker of malnutrition. It's not the case in elderly, because they need other (higher) cut-off points[9,12,22]. We didn't found a significantly higher percentage of patients at nutritional risk among elderly patients (65 years and more). It could be explained by cut-off of BMI in the screening tool we had used. Comparing only BMI we found significantly higher values of BMI among internistic inpatients (Group II), while, at the same time, the value of NS score was higher (Table 3). We can explain this with the weak correlation between BMI and the screening tool used, although BMI is a part of it. Furthermore, values of BMI generally followed the same pattern of behaviour with NS values. Discrepancy occurred in NS values 4 and 5 in Group I and NS value 5 in Group II (Figure 1). Using only BMI, we can underestimate cases with nutritional risk.

We can conclude that Nottingham Hospital Screening Tool is a simple, fast and useful tool for nutritional risk screening. The prevalence of nutritional risk among acute internistic patients was similar to those described in literature, and significantly lower among HD patients. Their malnutrition was as high as the malnutrition among internistic patients with chronic disease. So, NS tool is not enough sensitive for elderly and HD patients. Further studies are necessary to compare it with the full nutritive assessment.

REFERENCES

1. HOWARD JP, JONKERS-SCHUITEMA CF, KYLE U, Clin Nutr, 18 (1999) 379. — 2. ZALOGA GP, Lancet, 367 (2006) 1101. — 3. ISABEL M, CORREIA TD, WAITZBERG DL, Clin Nutr, 3 (2003) 235. — 4. JOHANSEN N, KONDRUP J, MUNK PLUM L, BAK L, NORREGAARD P, BUNCH E, BAERNTHSEN H, ANDERSEN JR, HOJLUND LARSEN I, MARTINSEN A, Clin Nutr, 23 (2004) 539. — 5. ESCOTT-STUMP S, Nutrition and diagnosis-related care (Lippincott Williams & Wilkins, Baltimore, 2002). — 6. THORSDÓTTIR I, ERIKSEN B, EYSTEINSDÓTTIR S, Clin Nutr, 18 (1999) 15. — 7. KRZNARIĆ Ž, VRANEŠIĆ D, VUCELIĆ B, Clin Nutr, 22 (2003) S 101. — 8. CAMPILLO B, PAILLAUD E, UZAN I, MERLIER I, ABDELLAOUI M, PERRENNEC J, LOUARN F, BORIES PN, Clin Nutr, 23 (2004) 551. — 9. BECK AM, OVESEN L, Clin Nutr, 17 (1998) 195. — 10. GARIBALLA S E, Clin Nutr, 20 (2001) 487. — 11. CAPRA S, BAUER J, DAVIDSON W, ASH S, Nutr Clin Pract, 17 (2002) 210. — 12. EDINGTON J, KON P, MARTYN CN, Clin Nutr, 15 (1996) 60. — 13. LOCATELLI F, FOUQUE D, HEIMBURGER O, DRUECKE TB, CANNATA-ANDIA JB, HOERL WH, RITZ E, Nephrol Dial Transplant 17 (2002) 563. — 14. MARCEN R, TERUEL JL, de la CAL MA, GAMEZ C, Nephrol Dial Transplant, 12 (1997) 2324. — 15. IKIZLER TA, HAKIM RM, Kidney Int, 50 (1996) 343. — 16. JERIN L, LADAVAC R, KUZMANOVIĆ G, DODIĆ D, GRIPARIĆ D, Act Med Croat, 57 (2003) 23. — 17. BARENDREGT K, SOETERS P, ALLISON SP, Diagnosis of malnutrition. Screening and assessment. In: SOBOTKA L (Ed), Basics in Clinical nutrition (Galen, Prague, 2000). — 18. PIRLICH M, SCHÜTZ T, NORMAN K, GASTELL S, LÜBKE HJ, BISCHOFF SC, BOLDER U, FRIELING T, GÜLDENZOPH H, Clin Nutr, 25 (2006) 563. — 19. MICKLEWRIGHT A, Clin Nutr, 18 (1999) 3. — 20. WOLFSON M, J Am Soc Nephrol, 10 (1999) 2244. — 21. PUPIM L.B, IKIZLER TA, Semin Dial, 16 (2003) 224. — 22. KONDRUP J, ALLISON SP, ELIA M, VELLAS B, PLAUTH M, Clin Nutr, 4 (2003) 415. — 23. JONES CH, WOLFENDEN RC, WELLS LM, J Ren Nutr, 14 (2004) 26. — 24. CHARNEY P, CHARNEY D, Nutr Clin Pract, 17 (2002) 226. — 25.

KONDRUP J, HØJGAARD RASMUSSEN H, HAMBERG O, STANGA Z, ad hoc ESPEN WORKING GROUP, Clin Nutr, 3 (2003) 321. — 26. KRUIZENGA HM, WIERDSMA NJ, VAN BOKHORST MAE, DE VAN DER SCHUEREN, HOLLANDER HJ, JONKERS-SCHUITEMA CF, VAN DER HEIJDEN E, MELIS GC, VAN STAVEREN WA, Clin Nutr, 2 (2003) 147. — 27. CANO NJM, ROTH H, APARICIO M, AZAR R, CANAUD B, CHAVEAU P, COMBE C, FOUQUE D, LAVILLE M, LEVERVE XM, Kidney Int, 62 (2002) 593.

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PROBIR NA NUTRITIVNI RIZIK MEĐU HOSPITALIZIRANIM I HEMODIJALIZIRANIM BOLESNICIMA

S A Ž E T A K

Pothranjenost je nezavisni čimbenik koji utječe na broj komplikacija, dužinu trajanja hospitalizacije i troškove. Cilj naše studije bio je odrediti prevalenciju nutritivnog rizika u bolesnika na redovitoj hemodijalizi (HD) (Grupa I, N=105) i usporediti je s prevalencijom u bolesnika na odjelima gastroenterologije, endokrinologije, hematologije i kliničke imunologije (Grupa II, N=652). Kao test za probir nutritivnog rizika upotrijebili smo »Nottigham Hospital Screening Tool« (NS). Prevalencija nutritivnog rizika iznosila je 9% u Grupi I i 21% u Grupi II (p=0,0002). Našli smo statistički značajno veći udio pothranjenih bolesnika među akutnim »internističkim» bolesnicima u odnosu na kronične bolesnike iz iste Grupe II. Pothranjenost među bolesnicima na redovitoj HD nije se statistički značajno razlikovala od kroničnih »internističkih» bolesnika. Nismo našli značajno veću prevalenciju nutritivnog rizika među starijim bolesnicima (65 i više godina). Korelacija između indeksa tjelesne mase (BMI) i NS bila je značajna, ali slaba (r=–0,32). Iz rezultata možemo zaključiti da je prevalencija nutritivnog rizika među bolesnicima na HD bila niža od očekivane. Za određivanje osjetljivosti upotrijebljenog probira potrebna su daljnja ispitivanja.