



Trabajo Original

Valoración nutricional

Factors associated with patient weight loss and prescribed diet during hospitalization *Factores asociados a la pérdida de peso de los pacientes y la dieta prescrita durante la hospitalización*

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Abstract

Objective: the aim of this study was to assess weight loss, diet prescribed, and nutritional status in hospitalized patients, as well as their associated factors.

Methods: weight loss during hospitalization, nutritional status, disease type, and prescribed diet were investigated in a retrospective study in 621 hospitalized patients. The chi-squared, Fisher's, Mann-Whitney, and Kruskal-Wallis tests were used for statistical analysis. To identify factors associated with weight loss a logistic regression analysis was performed. The significance level adopted for statistical tests was 5 %.

Results: patients who experienced weight loss during hospitalization were associated with longer hospital stays ($p < 0.0001$; OR = 1.052; 95 % CI = 1.030 to 1.073), malnourishment according to the subjective global assessment ($p = 0.0358$; OR = 1.520; 95 % CI = 1.028 to 2.248), digestive disorders ($p = 0.0081$; OR = 3.177; 95 % CI = 1.351 to 7.469), and digestive neoplasms ($p = 0.0407$; OR = 2.410; 95 % CI = 1.038 to 5.597).

Conclusion: weight loss during hospitalization was associated with neoplasms, digestive diseases, malnutrition, and length of stay.

Keywords:

Weight loss.
Diet prescribed.
Hospitalized patients.
Factors associated.

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Resumen

Objetivo: el objetivo de este estudio fue evaluar la pérdida de peso, la dieta prescrita y el estado nutricional de pacientes hospitalizados y sus factores asociados.

Métodos: se investigó la pérdida de peso durante la hospitalización, el estado nutricional, el tipo de enfermedad y la dieta prescrita en un estudio retrospectivo de 621 pacientes hospitalizados. Las pruebas del chi cuadrado, Fisher, Mann-Whitney y Kruskal-Wallis se utilizaron para el análisis estadístico. Para identificar los factores asociados con la pérdida de peso se utilizó la regresión logística. El nivel de significación adoptado para las pruebas estadísticas fue del 5 %.

Palabras clave:

Pérdida de peso.
Dieta prescrita.
Pacientes hospitalizados.
Factores asociados.

Resultados: los casos de pérdida de peso durante la hospitalización se asociaron a las estancias hospitalarias más largas ($p < 0,0001$; OR = 1,052; IC 95 % = 1,030; 1,073), la desnutrición según la evaluación global subjetiva ($p = 0,0358$; OR = 1,520; IC 95 % = 1,028; 2,248) los trastornos digestivos ($p = 0,0081$; OR = 3,177; IC 95 % = 1,351; 7,469) y las neoplasias digestivas ($p = 0,0407$; OR = 2,410; IC 95 % = 1,038; 5,597).

Conclusión: la pérdida de peso durante la hospitalización se asoció con las neoplasias y las enfermedades digestivas, la desnutrición y la duración de la estancia.

INTRODUCTION

Several studies have investigated malnutrition (1-3) in the hospital setting, showing the impact of nutritional risk (2) on clinical outcome and hospital costs. Some investigations (3) have evaluated factors associated with malnutrition, pointing out the need for greater attention to nutritional care. Correia et al, in 2017 (1), showed that most studies describe a high prevalence of malnutrition, with rates ranging from 40 % to 60 %. The authors reported an increase in malnutrition associated with increased length of hospital stay, and with clinical and infectious complications. Thus, several nutritional indicators (4,5) have been used to assess nutritional status. Some (6) show that in individuals identified by risk screening as being at nutritional risk, the diagnosis of malnutrition should be based on low body mass index or on combined weight loss indexes together with other indicators (6).

Nutritional intervention has contributed to reduce the risk of death and rehospitalization due to complications arising from poor nutritional status (7). In a prospective study (8), the priority of identifying nutritional status by means of nutritional screening instruments in clinical practice, in order to reduce morbidity and mortality rates (8), has been demonstrated. Other investigations have evidenced the importance of nutritional intervention with the use of specific supplements adapted to different clinical conditions (9). Another study (10) investigating nutritional status showed an association with age, nutritional therapy, and food intake, which were related to clinical outcomes such as prolonged hospital stay.

Within this context, hospital weight loss, food consumption, and type of nutritional therapy (10-12) have been investigated in the relevant literature, and have motivated the performance of this study. Thus, the aim of this study was to assess weight loss, the diet prescribed to, and the nutritional status of hospitalized patients and their associated factors.

METHODS

STUDY DESIGN, ETHICAL APPROVAL AND POPULATION CHARACTERISTICS

This was a retrospective study with data collected from medical records at a university hospital, conducted between the years

2018 and 2019. The study was approved by the institution's Research and Ethics Committee. The inclusion criteria adopted were age equal to or greater than 20 years, investigation of nutritional status within 48 hours of hospitalization, and complete nutritional information in the hospital medical records. Patients with incomplete records, terminal illness, and hospitalized only for clinical investigation and/or exams were excluded.

It is worth mentioning that in this hospital department a routine nutritional status assessment is carried out at the very beginning of hospitalization, at most within two days of admission. This procedure is routinely performed in hospital clinical practice by a team of nutritionists, residents and interns trained in nutrition at this institution, who assessed the nutritional indicators of anthropometry, used laboratory tests, administered nutritional screening instruments, and reviewed food histories. These data are routinely recorded in the medical records of inpatients.

For the composition of the sample to be studied in this investigation, all patients admitted to surgery services who met all inclusion criteria in the period defined for the study were selected. Initially 673 patients were recruited for this study, but 52 of them did not meet all the inclusion criteria. Thus, 621 adult inpatients of both genders were considered eligible for the study.

METHODOLOGICAL PROCEDURES

Data concerning type of disease, length of stay, age, gender, recent weight loss, weight loss during hospitalization, subjective global assessment, nutritional risk screening, anthropometry, type of diet prescribed on admission, alteration and acceptance of diet, use of protein-calorie supplementation during hospitalization, and percentage of habitual energy intake in relation to the estimated energy requirements (%HEI/EER) are described below.

Recent weight loss (RWL)

RWL was considered unintentional when the patient reported having lost > 5 % of their weight within the last 3 months, prior to hospitalization (6).

Weight loss during hospitalization

In order to assess weight loss during the hospitalization period, the present study considered the loss of at least 1 kg of weight from admission (1st day of hospitalization) to hospital discharge (last day of hospitalization). This criterion was established by the study authors to take into account in-hospital weight loss.

Subjective global assessment (SGA)

Nutritional status was assessed by the SGA and was classified according to standard cutoff points (13) into well nourished and malnourished (in this study, patients classified as mildly, moderately, and severely malnourished were all considered malnourished).

Nutritional risk screening (NRS)

Nutritional risk was assessed using the NRS tool, classifying patients as with a score ≥ 3 (at risk) or < 3 (without risk) (14,15).

Anthropometry

Body mass index (BMI) was evaluated according to standard cutoff points for adults (16) and the elderly (17), and body composition parameters such as arm circumference (AC), triceps skinfold (TSF), and arm muscle circumference (AMC) (18,19).

Type of diet prescribed at admission, diet change, diet acceptance, and use of protein-calorie supplementation during hospitalization

The type of diet prescribed during hospitalization was evaluated and classified as general diet (with solid food), soft diet (with soft food), liquid diet (with liquid food), watery diet (water, tea and gelatin; this diet was used during short post-operative periods), enteral and parenteral diet, or fasting (oral fasting). We investigated whether there was any change or alteration (yes/no) in the diet prescribed during hospitalization. For the evaluation of diet acceptance, acceptance was considered to be good when the patient reported consuming the totality of the diet offered; to be regular when the patient reported partial acceptance of the diet (not eating the entire diet offered); and to be poor when the patient had a low dietary intake. The use or not of calorie-protein nutritional supplements in liquid form (yes/no) during hospitalization was also surveyed.

Rate of habitual energy intake in relation to estimated energy requirements (%HEI/EER)

By nutritional anamnesis, the habitual energy intake of the week prior to hospitalization was evaluated through an individualized

assessment of all patients, investigating their usual diet (recall of habitual consumption) and type and quantity of food, fractioning, and meal times. This allowed to calculate total energy consumption in relation to estimated energy requirements using the Harris & Benedict equation (20). Subsequently, the rate of energy intake in relation to energy requirements was considered in this study as being: $< 75\%$ or $\geq 75\%$ (15,21,22).

STATISTICAL ANALYSIS

Initially, a descriptive analysis of the data was performed with the presentation of frequency tables for categorical variables and measures of position and dispersion for continuous variables. Then, for comparison of proportions, a Chi-square test or Fisher's exact test was used when necessary. To compare continuous or orderable measurements between 2 groups, the Mann-Whitney test was applied; and to do so between 3 or more groups, the Kruskal-Wallis test, followed by Dunn's test to find the differences, when necessary, was used. Subsequently, a logistic regression analysis was used to identify factors associated with weight loss during hospitalization. The power of the study was calculated for the results of logistic regressions. Power ranged from 0.70 to > 0.90 . For the subjective global assessment (SGA) tool, power was 0.70 (70 % power), and for the other variables it was > 0.90 ($> 90\%$). The level of significance adopted for the statistical tests was 5 % (23-25).

RESULTS

The average age of the population studied was 57.85 ± 15.23 years, and the length of hospital stay was 10.80 ± 8.91 days. The general characteristics of the population are described in table I.

When comparing the groups of patients with and without weight loss during hospitalization, there was a significant difference for length of stay ($p < 0.0001$), fasting time ($p = 0.0002$), SGA ($p = 0.0351$), and type of disease ($p = 0.0171$). In the study of factors associated with weight loss by logistic regression analysis, it was found that patients who experienced weight loss during hospitalization were associated with a longer hospital stay ($p < 0.0001$; OR = 1.052; 95 % CI = 1.030; 1.073), malnourishment by SGA ($p = 0.0358$; OR = 1.520; 95 % CI = 1.028; 2.248), digestive tract diseases (DTD) ($p = 0.0081$; OR = 3.177; 95 % CI = 1.351; 7.469), and digestive neoplasms ($p = 0.0407$; OR = 2.410; 95 % CI = 1.038; 5.597) (Table IIA). The other variables studied did not show a statistically significant difference (Tables IIA and IIB).

Table III shows a comparison between the types of diet prescribed during hospitalization and study variables. There was a statistically significant difference in the relationship between all study variables and type of diet prescribed during hospitalization. There was a significant difference between types of diet according to malnutrition classification by SGA, with a higher percentage of enteral and parenteral diet ($p < 0.0001$; chi-square test). There

Table I. General characteristics of the studied population (n = 621 patients)

Variables	Category	Frequency	Percentage
Gender	Female	227	36.55
	Male	394	63.45
Type of disease	Digestive tract disease	78	12.56
	Fractures and trauma	55	8.86
	Renal and urological	46	7.41
	Vascular	105	16.91
	Infections	19	3.06
	Head and neck neoplasms	48	7.73
	Neoplasms of the digestive tract	92	14.81
	Other diseases	100	16.10
	Other neoplasms	78	12.56
Hospitalization time	Up to 7 days	280	45.09
	> 7 days	341	54.91
Prescribed diet	Soft	144	23.30
	Enteral/Parenteral	37	5.99
	General	248	40.13
	Watery/Fasting	148	23.95
	Liquid	41	6.63
Supplement use	No	583	93.88
	Yes	38	6.12
Diet change	No	316	51.13
	Yes	302	48.87
Recent weight loss*	No	446	75.98
	Yes	141	24.02
Weight loss during hospitalization (\leq 1 kg)	No	436	70.21
	Yes	185	29.79
Global subjective assessment	Well nourished	474	76.33
	Malnourished	147	23.67
Nutritional risk screening	At risk	246	39.94
	No risk	370	60.06
Body mass index	Overweight	271	43.78
	Normal weight	250	40.39
	Low weight	98	15.83
%HEI/EER†	< 75 %	409	67.72
	\geq 75 %	195	32.28

*Recent weight loss (prior to hospitalization). †Percentage of habitual energy consumption in relation to estimated energy requirements.

was a significant difference between types of diet according to type of disease ($p < 0.0001$; Fisher's test). It was found that patients with digestive tract disease were prescribed fasting, water, and liquid diet with greater frequency. In cases of head and neck neoplasms and digestive tract neoplasms, a higher percentage of enteral and parenteral diets was observed (Table III).

Figure 1 shows the percentage distribution of the type of diet prescribed during hospitalization, according to weight loss (loss, or no loss, of at least 1 kg of weight during hospitalization). There was no statistically significant difference between patients who presented or did not present weight loss during hospitalization and the types of diets prescribed ($p = 0.1299$; chi-square test).

Table IIA. Descriptive analysis of the variables studied and factors associated or not with weight loss during hospitalization (weight loss of at least 1 kg during hospitalization)

Variables	Category	No weight loss n = 436	With weight loss n = 185	p-value	p-value [‡]	OR	95 % CI
Age	X ± SD	58.3 ± 15.3	56.8 ± 15.1	0.2469*	0.2654	0.994	0.983; 1.005
HT	X ± SD	9.6 ± 8.4	13.7 ± 9.3	< 0.0001*	< 0.0001	1.052	1.030; 1.073
FT	X ± SD	1.8 ± 2.5	2.2 ± 1.6	0.0002*	0.1599	1.109	0.960; 1.281
Gender, n (%)	Female	167 (38.3)	60 (32.4)	0.1648 [†]	0.1653	1.293	0.899; 1.860
	Male	269 (61.7)	125 (67.6)				
HT in days, n (%)	Up to 7 days	231 (53.0)	49 (26.5)	< 0.0001 [†]	< 0.0001	ref	ref
	> 7 days	205 (47.0)	136 (73.5)			3.128	2.146; 4.559
DIS, n (%)	DTD	44 (10.1)	34 (18.4)	0.0171 [†]	0.0081	3.177	1.351; 7.469
	Fractures and trauma	44 (10.1)	11 (5.9)		0.9565	1.028	0.384; 2.748
	Renal and urological	37 (8.5)	9 (4.9)		-	ref	ref
	Vascular	75 (17.2)	30 (16.2)		0.2473	1.644	0.708; 3.819
	Infections	12 (2.8)	7 (3.8)		0.1473	2.398	0.735; 7.828
	HN neoplasms	36 (8.3)	12 (6.5)		0.5280	1.370	0.515; 3.646
	GI neoplasms	58 (13.3)	34 (18.4)		0.0407	2.410	1.038; 5.597
	Other diseases	78 (17.9)	22 (11.9)		0.7384	1.160	0.486; 2.764
RWL, n (%)	No	318 (76.4)	128 (74.9)	0.6823 [‡]	0.6823	ref	ref
	Yes	98 (23.6)	43 (25.1)			1.090	0.721; 1.648
SGA, n (%)	WN	343 (78.7)	131 (70.8)	0.0351 [†]	0.0358	ref	ref
	Malnourished	93 (21.3)	54 (29.2)			1.520	1.028; 2.248
NRS, n (%)	At risk	165 (38.2)	81 (44.0)	0.1765 [†]	0.1769	1.273	0.897; 1.806
	No risk	267 (61.8)	103 (56.0)			ref	ref
AC, n (%)	≤ P15	131 (30.3)	73 (39.9)	0.0535 [†]	0.1936	1.359	0.856; 2.159
	P15-P85	201 (46.5)	69 (37.7)		0.4442	0.837	0.531; 1.320
	> P85	100 (23.1)	41 (22.4)		ref	ref	
TSF, n (%)	≤ P15	65 (15.4)	33 (18.1)	0.4408 [†]	0.2324	1.381	0.813; 2.345
	P15-P85	220 (52.3)	99 (54.4)		0.3240	1.224	0.819; 1.829
	> P85	136 (32.3)	50 (27.5)		ref	ref	
AMC, n (%)	≤ P15	145 (34.4)	76 (41.8)	0.2306 [†]	0.2967	1.345	0.771; 2.345
	P15-P85	217 (51.5)	83 (45.6)		0.9454	0.981	0.569; 1.691
	> P85	59 (14.0)	23 (12.6)		ref	ref	
BMI	Overweight	186 (42.8)	85 (46.2)	0.7142 [†]	0.5239	1.130	0.776; 1.644
	Normal weight	178 (40.9)	72 (39.1)		-	ref	ref
	Low weight	71 (16.3)	27 (14.7)		0.8163	0.940	0.558; 1.583

*Mann-Whitney test; [†]χ²-square test; [‡]Univariate logistic regression. ref = reference category; OR = odds ratio; 95 % CI: OR 95 % confidence interval; HT: hospitalization time; FT: fasting time; DIS: disease; DTD: digestive tract diseases; HN: head and neck; GI: gastrointestinal; RWL: recent weight loss; SGA: subjective global assessment; WN: well nourished; NRS: nutritional risk screening; AC: arm circumference; TSF: triceps skin fold; AMC: arm muscle circumference; BMI: body mass index.

Table IIB. Descriptive analysis of the variables studied and factors associated or not with weight loss during hospitalization (weight loss of at least 1 kg during hospitalization)

Variables	Category	No weight loss n = 436	With weight loss n = 185	p-value	p-value [†]	OR	95 % CI	
%HEI/EER, n (%)	< 75 %	292 (68.7)	117 (65.4)	0.4223 [‡]	0.4225	ref	0.804; 1.684	
	≥ 75	133 (31.3)	62 (34.6)			1.163		
Prescribed diet, n (%)	Soft	95 (21.9)	49 (26.5)	0.1299 [‡]	0.0840	1.483	0.948; 2.318	
	Enteral/Parenteral	22 (5.1)	15 (8.1)		0.0651	1.960	0.959; 4.009	
	General	184 (42.5)	64 (34.6)		-	ref		
	Watery/Fasting	107 (24.7)	41 (22.2)		0.6793	1.102	0.696; 1.743	
	Liquid	25 (5.8)	16 (8.6)		0.0828	1.840	0.924; 3.665	
Supplement use	No	411 (94.3)	172 (93.0)	0.5386 [‡]	0.5393	ref	0.402; 1.610	
	Yes	25 (5.7)	13 (7.0)			0.805		
Diet acceptance	Good	276 (79.3)	123 (79.9)	0.9893 [‡]	0.8905	ref	0.553; 1.673	
	Regular	49 (14.1)	21 (13.6)		0.9501	0.962		0.451; 2.112
	Poor	23 (6.6)	10 (6.5)			0.976		
Diet change	No	228 (52.7)	88 (47.6)	0.2465 [‡]	0.2468	ref	0.868; 1.731	
	Yes	205 (47.3)	97 (52.4)			1.226		

[‡] χ^2 -square test; [†]Univariate logistic regression. ref = reference category; OR: odds ratio; 95 % CI: OR 95 % confidence interval; %HEI/EER: percentage of habitual energy consumption in relation to estimated energy requirements.

DISCUSSION

This investigation showed that patients who were hospitalized for a period longer than 7 days had a three-fold greater risk of experiencing weight loss. Those who were malnourished according to the SGA had a 1.5 times greater risk. Patients diagnosed with digestive tract diseases were 3.2 times more likely to experience weight loss when compared to those with kidney and urological diseases. And patients with digestive neoplasms had a 2.4 times greater risk of presenting weight loss when compared to patients with renal and urological diseases.

A few recent studies have shown data similar to the findings of our study, such as the study by Takaoka et al. in 2017 (26); they investigated nutritional status during hospitalization using nutritional tracking instruments and laboratory exams. The authors showed that increase in hospital stay was associated with several nutritional indicators such as SGA, NRS-2002, serum albumin, and weight loss, among others (26). Another study performed by Orlandoni et al. in 2017 (27) pointed out that malnutrition was an independent predictor of length of hospital stay and mortality, and that malnourished patients were hospitalized for almost three more days, compared with non-malnourished patients. The authors also showed that risk of death during hospitalization was 55 % higher in malnourished patients (27). Different findings were observed in the study by Cano-Torres et al., also in 2017 (28), where nutritional intervention and dietary advice contributed to a reduction in length of hospital stay but not in mortality among hospitalized malnourished patients. Other findings report that

hospitalized patients may suffer from inadequate nutritional therapy, and the risk of developing malnutrition may increase during hospitalization (29).

A prospective study (30) that evaluated changes in nutritional status during hospitalization in Canada investigated SGA and body weight measurements during hospital stay and at discharge. Using multivariate analysis models, the authors showed that the decline in nutritional status according to SGA and weight loss ≥ 5 % were significantly associated with a longer hospital stay (30).

In an observational study conducted by Rattray et al. in 2017 (31), the nutritional adequacy of the diets prescribed and consumed by inpatients was assessed, and both supply and intake were considered adequate when they met ≥ 75 % of their estimated needs. In the study in question (31), it was observed that the average amount of energy and protein supplied to and consumed by the patients was significantly lower than the estimated average needs. The authors also observed that patients on liquid oral diets had a lower energy intake, showing that inpatients on liquid oral diets could develop a higher risk of malnutrition (31).

In our study, no association was observed between the type of diet that was prescribed on admission and the weight loss that occurred during hospital stay ($p = 0.1299$) (Fig. 1). Thus, we can suggest that further investigations should be carried out of hospital diets in order to better meet the energy and nutritional needs of hospitalized patients, contributing to a reduction in weight loss and hospital malnutrition. In a recent retrospective study (32) investigating the relationship between weight changes, diet, and dietary intake changes in patients with cancer, the authors found

Table III. Comparison of study variables by types of prescribed diet

Variables	Category	GD n = 248	SD n = 144	LD n = 41	WDF n = 148	EPD n = 37	p-value
Age	X ± DP	56.2 ± 15.6	61.9 ± 14.9	53.6 ± 16.9	58.1 ± 14.8	56.8 ± 11.6	0.0057 [§]
Gender, n (%)	F	100 (40.3)	54 (37.5)	11 (26.8)	55 (37.2)	5 (13.5)	0.0193 [†]
	M	148 (59.7)	90 (62.5)	30 (73.2)	93 (62.8)	32 (86.5)	
Disease, n (%)	DTD	9 (3.6)	15 (10.4)	12 (29.3)	39 (26.4)	2 (5.4)	< 0.0001 [‡]
	Fractures and trauma	29 (11.7)	13 (9.0)	2 (4.9)	7 (4.7)	4 (10.8)	
	Renal and urological	33 (13.3)	5 (3.5)	1 (2.4)	7 (4.7)	0 (0.0)	
	Vascular	58 (23.4)	29 (20.1)	2 (4.9)	15 (10.1)	1 (2.7)	
	Infections	10 (4.0)	4 (2.8)	0 (0.0)	3 (2.0)	2 (5.4)	
	HN neoplasms	11 (4.4)	11 (7.6)	3 (7.3)	11 (7.4)	11 (29.7)	
	DT neoplasms	9 (3.6)	24 (16.7)	11 (26.8)	33 (22.3)	15 (40.5)	
	Other diseases	51 (20.6)	24 (16.7)	5 (12.2)	18 (12.2)	1 (2.7)	
RWL, n (%)	No	187 (79.6)	109 (82.0)	20 (55.6)	108 (75.0)	19 (52.8)	0.0001 [†]
	Yes	48 (20.4)	24 (18.0)	16 (44.4)	36 (25.0)	17 (47.2)	
SGA, n (%)	WN	211 (85.1)	114 (79.2)	28 (68.3)	105 (70.9)	13 (35.1)	<.0001 [†]
	M	37 (14.9)	30 (20.8)	13 (31.7)	43 (29.1)	24 (64.9)	
NRS, n (%)	At risk	64 (26.2)	66 (45.8)	21 (51.2)	66 (44.9)	27 (73.0)	<.0001 [†]
	No risk	180 (73.8)	78 (54.2)	20 (48.8)	81 (55.1)	10 (27.0)	
AC, n (%)	≤ P15	72 (29.4)	38 (26.4)	16 (39.0)	52 (35.9)	25 (67.6)	0.0002 [†]
	P15-P85	119 (48.6)	64 (44.4)	15 (36.6)	60 (41.4)	11 (29.7)	
	> P85	54 (22.0)	42 (29.2)	10 (24.4)	33 (22.8)	1 (2.7)	
TSF, n (%)	≤ P15	32 (13.2)	26 (18.3)	7 (17.1)	19 (13.9)	14 (37.8)	0.0125 [†]
	P15-P85	132 (54.3)	69 (48.6)	18 (43.9)	80 (58.4)	17 (45.9)	
	>P85	79 (32.5)	47 (33.1)	16 (39.0)	38 (27.7)	6 (16.2)	
AMC, n (%)	≤ P15	78 (32.0)	44 (31.0)	20 (48.8)	53 (39.0)	25 (67.6)	0.0003 [†]
	P15-P85	132 (54.1)	81 (57.0)	16 (39.0)	58 (42.6)	12 (32.4)	
	> P85	34 (13.9)	17 (12.0)	5 (12.2)	25 (18.4)	0 (0.0)	
BMI	Overweight	126 (51.2)	61 (42.4)	17 (41.5)	61 (41.2)	5 (13.5)	0.0022 [†]
	Normal weight	87 (35.4)	62 (43.1)	18 (43.9)	62 (41.9)	19 (51.4)	
	Low weight	33 (13.4)	21 (14.6)	6 (14.6)	25 (16.9)	13 (35.1)	

*Kruskal-Wallis test; [†]χ²-square test; [‡]Fisher's exact test; [§]Differences between soft and general diets; soft and liquid. GD: general diet; SD: soft diet; LD: liquid diet; WDF: watery diet and fasting; EPD: enteral and parenteral diet; F: female; M: male; DTD: digestive tract disease; HN: head and neck; DT: digestive tract; Dis: diseases; RWL: recent weight loss; SGA: subjective global assessment; WN: well nourished; M: malnourished; NRS: nutritional risk screening; AC: arm circumference; TSF: triceps skin fold; AMC: arm muscle circumference; BMI: body mass index.

a significant positive correlation between dietary energy or protein consumption and weight change. Another finding of the study (32) was a correlation between anorexia and weight loss; but the authors found no similar correlation between changes in dietary intake and changes in weight (32). The study also pointed out that patients with advanced cancer and weight loss could be consuming diets insufficient to maintain body weight (32). In any case, it is essential to monitor dietary consumption and the evolution of body weight throughout hospitalization. A prospective obser-

vatational study (33) that investigated the clinical characteristics and long-term results of unintentional weight loss in outpatients, showed the relevance of monitoring long-term clinical evolution in patients with unexplained weight loss (33).

And in a prospective study in a Brazilian hospital (34), factors related to the reduction of prescribed enteral therapy were investigated, showing that operational problems, gastric stasis, and accidental loss of the gastric tube, among others, were the main reasons for inadequate food intake.

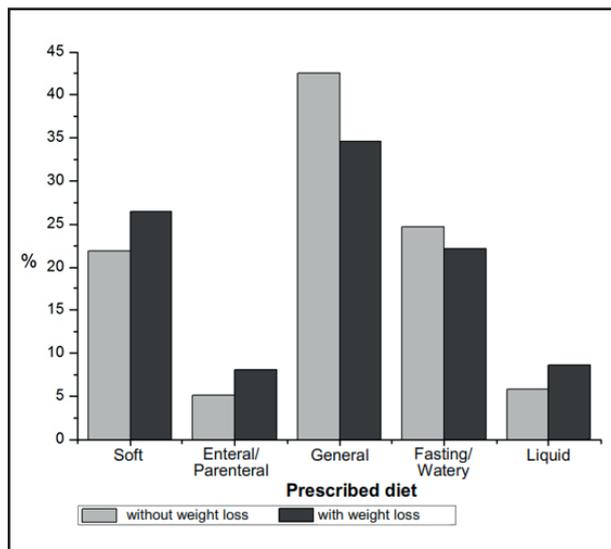


Figure 1.

Percentage distribution of the type of diet prescribed on admission, according to weight loss (loss or no loss of at least 1 kg weight), during hospital stay: $p = 0.1299$ (χ -square).

The findings of the present study are interesting and can easily illustrate clinical scenarios for several underlying conditions. Our findings also point out the importance of investigating weight loss, of assessing type of diet and food consumption, and of daily, continuous monitoring of the nutritional aspects of hospitalized patients. Some works are in line with the proposal of our investigation, such as a cross-sectional study (35) to investigate the tracking of malnutrition through anthropometric and laboratory indicators in patients admitted to medical wards. The authors observed a longer hospital stay in malnourished patients, evidencing that malnutrition was more common among patients with malignancies (35).

It is important to note that the variables and/or all nutritional indicators investigated in the present study are currently instruments in use for the nutritional assessment and monitoring of hospitalized patients, and have been used in other investigations reported in the relevant literature. This is the case of a study that assessed the prevalence of malnutrition (29) and determined the daily caloric intake of hospitalized patients. The nutritional risk found by the NRS was 44.6 % (29), an index similar to that found in the present investigation, where we verified a 39.9 % rate of nutritional risk. As for malnutrition by SGA, the authors found a 53.6 % rate of malnutrition (29) while in our study it was 23.6 %. Possibly, the malnutrition found here by the SGA may have been underestimated in relation to the nutritional risk obtained by the NRS.

Finally, in the present study it was observed that all the variables studied showed a significant association with the type of diet prescribed at hospital admission (Table III). Although no direct relationship was found between diet and weight loss during hospital stay (Table IIB), due to the fact that we found these differences

in relation to the type of diet prescribed, we can suggest that “indirectly” there is an association of weight loss during hospitalization with the prescribed diet. The diet prescribed was not directly related to weight loss but through the factors that are associated with diet prescription (in these factors there was a significant difference).

CONCLUSION

Malnutrition, diseases, digestive neoplasms, and length of stay were associated with weight loss during hospitalization. The findings of this study highlight the relevance of nutritional and dietary monitoring of hospitalized patients.

STUDY LIMITATIONS

This study had some limitations inherent to the type of retrospective study, in relation to other prospective and controlled studies, with loss of some nutritional variable data. That is why there was less information for some of the nutritional variables analyzed when compared to others. On the other hand, retrospective studies have the advantage that all the nutritional parameters that were evaluated reflected the actual conditions of routine hospital care, as it actually happens in daily hospital clinical practice, and not in a controlled manner, which could make the outcome artificial.

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