



## Nutritional differences in malnourished patients according to their liquid-intake habits after hospital discharge

Cristina Casals<sup>1,2</sup>, María Ángeles Vázquez Sánchez<sup>3</sup>, José Luis Casals Sánchez<sup>4</sup> and Ernesto Suárez-Cadenas<sup>2</sup>

<sup>1</sup>Institute of Nutrition and Food Technology. Biomedical Research Centre. Universidad de Granada. Granada, Spain. <sup>2</sup>Faculty of Sport Sciences. Universidad de Granada. Granada, Spain. <sup>3</sup>Faculty of Health Sciences. Universidad de Málaga. Málaga, Spain. <sup>4</sup>Section of Rheumatology. Hospital Clínico Universitario Virgen de la Victoria. Málaga, Spain

### Abstract

**Introduction:** Malnutrition is a serious and relatively common problem among hospitalized patients; moreover, it is known that a good hydration state contributes to health and wellbeing.

**Objective:** The aim of this study was to determine the relationship between nutritional status, functional dependency, quality of life and liquid-intake habits in malnourished patients after hospital discharge.

**Methods:** Cross-sectional descriptive study in 91 patients (45 males) who presented malnutrition at hospital discharge. The patients were grouped according to their liquid intake estimated through the Mini Nutritional Assessment questionnaire: 3-5 glasses (n = 42), and > 5 glasses (n = 46); removing from analysis < 3 glasses of liquid intake (n = 3). The body mass index, weight, Malnutrition Universal Screening Tool (MUST), functional dependency (Barthel questionnaire), and quality of life (Short Form 12 Health Survey [SF-12]) were assessed 2-months after discharge.

**Results:** The > 5 glasses liquid intake group showed better nutritional status than the 3-5 glasses intake group, for weight (p < 0.001), body mass index (p = 0.001), and MUST scale (p = 0.020). Additionally, the > 5 glasses liquid intake group significantly scored higher values in the total SF-12 questionnaire (p = 0.013), presenting better self-reported quality of life, and higher functional independency in the Barthel index (p = 0.037) than the 3-5 glasses liquid intake group (p = 0.013).

**Conclusions:** Although further research is needed to elucidate the characteristics of this relationship, descriptive comparisons between groups showed favorable nutritional status, functional independency and quality of life for the > 5 glasses of liquid intake compared with the 3-5 glasses of liquid intake group during a 2-months follow-up.

**Key words:** Dependency. Quality of life. Nutritional status. Malnutrition. Hydration.

ly in Spain (2). Therefore, a considerable number of well-nourished patients at the hospital admission can return to the community with malnutrition, making necessary its detection and home follow-up to improve their health. In this line, the health related quality of life of malnourished patients at hospital discharge can be impaired, as it has been reported in a group of Spanish patients (3). This population showed an increased risk of morbidity and mortality compared to their peers (4,5), requiring prolonged hospital stays and a higher number of readmissions (6); thereby increasing even more their malnutrition risk.

Although the interest on these facts has increased in recent years, and consensus on the approach to hospital malnutrition in Spain has been published (7), there is a lack of studies assessing the hydration status in malnourished patients. It is known and generally accepted that a good hydration state contributes to health and wellbeing; hence, the effect of hydration habits on health of malnourished patients can be useful information for healthcare practice. Specially, if we take into account that the liquid intake of the Spanish population is below the recommended levels (8).

Thus, assessing the nutritional status according to liquid-intake habits in malnourished patients after hospital discharge, and its impact on quality of life and dependency, could be interesting factors for the health clinic practice and follow-up.

### INTRODUCTION

Malnutrition is a serious and relatively common problem among hospitalized patients; moreover, this health risk increases during hospitalization (1), a fact that has been widely reported, specific-

### OBJECTIVES

The aim of the present study was to assess differences in body mass index (BMI), weight, malnutrition status, dependency and quality of life according to liquid-intake habits of malnourished

#### Correspondence:

Cristina Casals. Institute of Nutrition and Food Technology. Biomedical Research Centre (laboratory 116). Avda. del Conocimiento, s/n. 18100 Granada, Spain  
e-mail: [casalsvazquez@gmail.com](mailto:casalsvazquez@gmail.com)

patients after hospital discharge during a 2-month home follow-up.

## METHODS

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### DESIGN

This was a cross-sectional descriptive study, conducted at the healthcare district of Málaga-Guadalorce, Spain. The nutritional status, dependency and self-reported quality of life levels were assessed in malnourished patients 2 months after hospital discharge, and compared by their liquid-intake habits (2 groups). The present study was approved by the Research Ethics Committee of the Málaga Healthcare District and was in accordance with the Declaration of Helsinki.

### PARTICIPANTS

A total of 88 patients (44 males and 44 females), aged  $72.3 \pm 11.84$  years old, were included in the study. After the participants were informed about the procedure and possible risks involved, written informed consent was obtained from all participants. The inclusion criteria were the following: a) hospitalization; b) medium-high risk of malnutrition on the MUST scale; c) older than 18 years; d) willingness to participate in the study and signing of the informed consent form; and e) resident of the geographical area corresponding to the participating health center. The exclusion criteria consisted of having undergone any of the following during hospitalization: a) treatment with oral food supplements, enteral or parenteral nutrition; b) treatment with chemotherapy or radiation therapy; and c) malabsorption syndrome.

### PROCEDURES

Screening was conducted to determine the patient eligibility during hospitalization by using the Nutritional Filter (Filtro Nutricional, FILNUT) (9) computer program. If the presence of a significant risk was detected, we proceeded with the assessment of each patient using the Malnutrition Universal Screening Tool (MUST) (10). If a medium-high risk of malnutrition was detected through the MUST, the patient was offered the opportunity to join the study provided they were not undergoing treatment with dietary supplements or enteral or parenteral nutrition. The patient was then informed of the study and asked for his/her informed consent.

After a 2-month follow-up, the 91 patients filled out the Mini Nutritional Assessment (MNA) questionnaire, in Spanish language (11). One item of the MNA is able to classify 3 categories according to the number of glasses of liquid intake: a) < 3 glasses; b) 3-5 glasses; and c) > 5 glasses of liquid per day. Of the 91 patients, only 3 were included in the < 3 glasses of liquid intake group; as the sample size does not provide enough statistic power, the 3 mentioned participants were excluded of the analysis. Therefore,

88 patients were finally included in the study classified into two categories: the 3-5 glasses of liquid intake group consisted of 42 patients, while the > 5 glasses intake group consisted of 46 patients.

The nutritional state was again assessed through the MUST; additionally, weight and BMI, calculated as  $\text{weight (kg)/height(m)}^2$ , were recorded as nutritional state indicators. The participants' height and weight were recorded both in the morning, between 8 am and 10 am. The degree of functional independency in daily life activities was assessed by using the Barthel index in its Spanish version (12). The patient perceived quality of life was assessed using the Spanish version of the Short Form 12 Health Survey (SF-12) (13), which provides 3 scores: physical component, mental component, and total score (the sum of both components).

### STATISTICS

Data are expressed as mean  $\pm$  standard deviation. After the normality of distribution was proven through the Kolmogorov-Smirnov test, dependent variables were compared by the liquid-intake habits (> 5 glasses or 3-5 glasses) by using the Student's t test. The level of significance was set at  $p < 0.05$ . All statistical analysis were performed using the SPSS package.

### RESULTS

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The > 5 glasses liquid intake group showed better nutritional status than the 3-5 glasses intake group, with statistically significant differences for weight, BMI, and MUST scale. The group with higher liquid intake habits also presented a higher functional independency than the group who drunk from 3 to 5 glasses per day, assessed through the Barthel index. Additionally, the > 5 glasses liquid intake group significantly scored higher values in the total, physical and mental SF-12 questionnaire components, presenting better self-reported quality of life than the 3-5 glasses liquid intake group (Table I). The groups did not present differences by sex or age.

### DISCUSSION

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The main results of this study are the statistically significant differences between groups for their nutritional status (BMI and MUST), dependency (Barthel index) and quality of life (SF-12) levels in favor of the patients who drunk a higher number of glasses of liquids. Patients presented protein malnutrition at hospital discharge and the assessment was performed 2 months later. Therefore, these results stand out the relevance of adequate patient follow-up, the role of case manager nurses, and the communication and collaboration of the hospital and Primary Care, since patients' habits during follow-up were associated with health differences. In this sense, some malnutrition approaches have been previously reported; for example, dietary counseling seems to be

**Table I.** Differences in nutritional status, dependency and quality of life according to the liquid intake habits of patients who presented malnutrition at hospital discharge

Liquid intake habits	3-5 glasses	> 5 glasses	p values
Weight (kg)	60.8 (2.08)	70.3 (1.6)	< 0.001
Body mass index (kg/m <sup>2</sup> )	23.9 (0.58)	26.5 (0.54)	0.001
MUST scale	0.88 (0.16)	0.39 (0.11)	0.020
Barthel index	72.4 (4.09)	82.1 (3.12)	0.037
SF-12 total score	43.7 (2.39)	52.8 (2.55)	0.013
SF-12 physical component	39.4 (2.29)	48.1 (2.55)	0.013
SF-12 mental component	48.1 (2.61)	57.5 (2.61)	0.013
N	42	46	

Data are expressed as mean (standard deviation). MUST: Malnutrition Universal Screening Tool; SF-12: Short Form 12 Health Survey.

an effective strategy for improving nutritional status, quality of life and functional dependency of malnourished patients (14,15). Nevertheless, the impact of hydration counseling on health has not been properly analyzed yet, and little information is available regarding malnourished patients (16).

In our study, health related quality of life was positively associated with hydration; however, to the best of our knowledge, information about this possible relationship in malnourished patients has not been published yet. The patients' SF-12 score mean was similar to the Spanish mean in the > 5 glasses of liquid intake group, whereas the 3-5 glasses of liquid intake group showed a SF-12 mean significantly lower than reference values (13). The SF-12 is useful in describing overall community health status and testing clinical improvement during home follow-up (17). Accordingly, 2 months after hospital discharge, patients with liquid-intake habits from 3 to 5 glasses a day showed an impaired health-related quality of life and their assessment when returning to the community is convenient.

Quality of life and functional independency are closely related; specifically, the Barthel index evaluates the capacity to carry out basic daily activities. The participants' index means corresponded with a moderate dependency (18), although the 10 points of difference between groups might affect independency for drinking. This difference can be explained by a malnutrition-induced muscle loss since groups differed by nutritional state. Thereby, the possible relationship between functional dependency, quality of life and hydration in hospitalized patients could be a new research focus with impact on the clinic practice and the patient's wellbeing.

Additionally, hospital care should include the use of MUST to screen nutritional status of hospitalized patients, since it provides great reliability, reproducibility and simplicity (19). According to our data, 32 patients presented moderate risk of malnutrition in the MUST scale (score > 1), which means that 34.6% of malnourished patients at hospital discharge keeps still under malnutrition risk after 2 months of their returning to the community. Hence, if malnutrition is detected during hospitalization, the use of MUST in Primary Care follow-up is recommended, especially in more vulnerable patients, such as old-people (e.g., over 75 years). In

this population, the risk of malnutrition is positively related to the number of chronic diseases and the social risk (20), and, additionally, they are under dehydration risk (21), making it difficult to discriminate between protein/caloric malnutrition and dehydration impacts on health. Thus, a significant limitation of our study is the fact that we cannot establish a cause-effect relationship between liquid intake habits and nutritional status, dependency and quality of life; we can just establish certain associations. Therefore, it is necessary to obtain further scientific evidence about the impact of different hydration strategies on the patients' health from randomized clinical trials, after these modest results from cross-sectional design have been presented and the lack of relevant scientific information has been highlighted.

To sum up, liquid-intake habits are related to nutritional status, quality of life and dependency in malnourished patients at hospital discharge during a 2 months follow-up, although further research is needed to elucidate the characteristics of this relationship. In our sample, most patients drunk more than 3 glasses a day (96.70%), while a similar percentage of patients were in the MNA questionnaire category corresponding to the > 5 glasses (46 patients) or in the 3-5 glasses (42 patients) of liquid intake a day. Comparisons between groups showed favorable nutritional status, functional independency and quality of life for the > 5 glasses of liquid intake group, reporting preliminary findings that can boost the development of clinical trials on this topic.

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