



Malnutrition Screening and Prevalence in a Population of Inpatients with Non Communicable Diseases: A Cross-Sectional Study (Algeria, 2020)

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ABSTRACT

Introduction: Hospitalization is a stressful event that affects the nutritional status of adults and elderly. Inpatients with non-communicable diseases (NCDs) represent a vulnerable group facing an increased risk of malnutrition. The aim of this study was to estimate the prevalence of malnutrition in Algerian inpatients with non-communicable diseases in a public hospital in Skikda (Algeria).

Methods: This was a cross-sectional, descriptive survey carried out during one month from the 15th November 2020 to the 10th December 2020, with inpatients with at least one NCD (cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases). The assessment of their nutritional status was carried out using the Subjective Global Assessment tool (SGA).

Results: One hundred and five patients were included. One of two patients had at least one non-communicable disease. In our study, the SGA allowed us to estimate the malnutrition prevalence at 44.76% (ranks B and C: moderate and severe malnutrition). Our study showed a length of stay (LOS) of 4.14±7.69 days.

Conclusion: The considerable prevalence of malnutrition was, in part, due to reduced food intake and short LOS. In order to detect and prevent malnutrition, the nutritional status assessment must be included in the routine of health care in Algeria.

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Introduction

Non-communicable diseases (NCDs) are the leading cause of death worldwide. In Algeria, the four major NCDs (cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases) accounted for 76% of all deaths in 2016 [1]. NCDs represent an economic and health burden on individuals and populations because they require repeated interactions with the health system, with recurring and continuous medical expenditures. Hospitalization constitutes one of the principal healthcare-related costs of NCDs and it is a stressful event that affects the nutritional status of adults and elderly by causing malnutrition (under-nutrition), called hidden hunger, which is frequent in the hospital setting leading to poor

hospitalization outcomes and survival due to the lack of basic knowledge concerning dietary requirements and practical aspects of the hospital's food provision. Hence, the relationship between malnutrition and hospitalization is reciprocal [2-8].

Thus, malnutrition represents a double burden within populations in low and middle-income countries like north African countries, including Algeria, that has experienced significant demographic, social, economic change, and real nutritional, epidemiological, and lifestyle transitions (9,10). These countries are characterized by nutritional inequalities, low-income levels, and insufficient health expenditure and face a shift in disease burden from communicable to non-communicable

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diseases (11–13). This heavy burden of malnutrition on health-care systems is to be taken seriously because the experience with the global pandemic shows that health care systems can be in an unexpected way challenged and exhausted (14,15). For example, a study in Wuhan, China, confirms that malnutrition contributed to prolonged hospitalization of inpatients with COVID-19 (16). On the other side, it is now well established that NCDs, particularly among the elderly, increase the susceptibility to COVID-19 disease (17).

Despite the importance of this topic, research on it is few and modest. In Algeria, no official reports on the nutritional status of inpatients with NCDs were available. Except for some studies about the nutritional status assessment of some vulnerable groups of the population (18–21), there is no considerable research about NCDs patients. Provided data on malnutrition status would help to adopt control strategies to avoid malnutrition among NCDs inpatients. Different tools exist to assess the nutritional status of NCDs inpatients. Subjective Global Assessment (SGA) is the most validated standardized assessment of malnutrition, (22,23). It considers all aspects of the nutritional diagnoses, such as the quantity and type of food intake, weight loss, symptoms related to nutritional disorders, and associated functional difficulties. SGA is widely used for hospitalized patients with good sensitivity and specificity. Besides, the capacity of malnutrition assessment tools is usually measured against it (24,25).

This research aims to study the prevalence of malnutrition among inpatients with NCDs, related risk factors such as comorbidities, and hospitalization length.

Patients and Methods

Study Design

This study was a cross-sectional study of a representative sample of hospitalized adults in a public hospital in Skikda (east of Algeria), from the 15th November 2020 to the 10th December 2020. A questionnaire was filled using information collected from interviewing patients face to face.

Setting and Population

Abdul Razzaq Bouhara is the second public hospital in Skikda, with 240 beds and eight wards (26). Our study was conducted among adult inpatients in two medical departments we were

allowed in: general medicine and oncology. We excluded from the target population pregnant women and patients who could not be interviewed for diverse reasons: end of life, impaired health status, deaf and voiceless person.

Ethics

The conduction of this research was approved in coordination between the University of Batna and the Directorate of Health of Skikda. Abdul Razzaq Bouhara Hospital was the only hospital not receiving cases of Coronavirus in Skikda, for this reason it has approved our admission to conduct the research. The study was conducted according to the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study.

Sampling

Our study sample is a stratified random sample of 105 patients from an initial population of 167 patients. After excluding records with incomplete information, the population was stratified into four strata representing the four principal NCDs.

Measurements

A questionnaire was used to document general information of participants, including the year of birth, gender, date of admission, name of ward, and type of diseases. Bodyweight was measured using Seca® mechanic scale to the nearest 100g, and body height was measured using a stadiometer to the nearest 0.1cm. The BMI is defined as the body mass divided by the square of the body height, and is expressed in units of kg/m².

The nutritional status of participants was assessed using the Subjective Global Assessment tool (SGA), which considers nutrient intake, weight loss, symptoms, functional capacity, and physical exam. It classifies nutrition status as well-nourished (A), mild to moderately malnourished (B), or severely malnourished (C). A patient is rated as SGA class B if there was at least 5% weight loss without any recent stabilization or regain, dietary intake reduction, and mild loss of subcutaneous tissue. A patient is ranked as SGA class C if he/she had severe loss of subcutaneous tissue, muscle wasting, and edema (27,28). SGA does not use an explicit numerical weighting scheme. Instead, a rank is assigned based on subjective weighting. For example, if the patient had considerable edema, ascites, or

tumor mass, the amount of weight loss has less influence, if the patient had a recent weight gain that did not appear to be merely fluid retention, he or she is ranked A, even if the net loss was between 5% and 10 % (29).

To better understand the assessment method, we suggest three examples:

Case 1: A 63-yr-old man was admitted to the hospital for complications of his chronic heart disease. He had suffered from vomiting, but this problem was resolved. He had lost 10.25% of his usual body weight (78 kg); however, his weight had been stable for the previous three months. He reported he had been working with his usual energy up to the time of admission. On physical examination, no evidence of loss of fat, muscle, edema or ascites. This patient was classified as "A," well-nourished. Although his net weight loss was moderate, it had stabilized recently.

Case 2: A 68-yr-old woman with breast cancer and heart disease was admitted to the hospital for chemotherapy. Her body weight was stable for more than six months. She reported inadequate nutrient intake for more than six months without any improvement, and vomiting, nausea, and diarrhea that we considered chemotherapy side. The patient felt slightly weak but was able to ambulate. There was no fever. On physical examination, she had a small amount of loss of subcutaneous fat and muscle. There was no edema or ascites. This patient was classified as "B," moderately malnourished. The ranking was influenced by the continuing limitation of

nutritional intake to a suboptimal solid diet and mild loss of fat and muscle.

Case 3: An 82-yr-old woman was admitted to the hospital for chemotherapy. She had breast cancer and diabetes. She had improved gastrointestinal symptoms (diarrhea, pain on eating, and anorexia), affecting her nutritional intake. These symptoms led to a severe body weight loss in the previous six months. She has no dysfunction. On physical examination, there was subcutaneous tissue loss and muscle wasting. There was trace edema in the ankles and no ascites. This woman was classified as "C," severe malnutrition. The ranking was influenced most by the continuing large weight loss, change in dietary intake, and acute physical findings.

Statistical methods

Epi-Info 3.5.3 was used for data entry, processing, and analysis. Descriptive statistics were used to characterize the study population. It was checked that obtained values were normally distributed. The test of analysis of variance (ANOVA) was used to compare between the SGA rating and the hospitalization conditions (NCDs, comorbidities, length of stay (LOS), cause of hospitalization). Pearson's correlation was applied for the relationship between SGA rating and test features (nutritional intake, weight loss, nutritional impact symptoms, functional capacity, and physical exam). A P-value of < 0.05 was considered significant.

Table 1. Population characteristics (Skikda-Algeria, 2020)

Characteristics		N=105 (100%)
Age (years)		58.21±13.69 [18.00-90.00]
Gender [N(%)]	Female	79 (75.20)
	Male	26 (24.80)
NCD [N(%)]	Cancer	66 (62.86)
	CVD	46 (43.81)
	Diabetes	31 (29.50)
	CRD	13 (12.38)
	One NCD	62 (59.05)
Number of NCDs [N(%)]	Two NCDs	33 (31.43)
	Three NCDs	9 (8.57)
	Four NCDs	1 (0.95)
Co-morbidity [N(%)]	Yes	42 (40.00)
	No	63 (60.00)
LOS		4.14±7.69 [1-60]
Hospitalization related to NCD [N(%)]	Yes	96 (91.40)
	No	9 (8.60)

Qualitative data as shown as percentage of subjects [N(%)] and quantitative data are means (SD) [minimum-maximum]

N: Population size; NCD: Non Communicable Disease; CVD: Cardio Vascular Disease; CRD: Chronic Respiratory Disease; LOS: Length of Stay

Results

Population characteristics

The characteristics of the surveyed population are summarized in Table 1. The age of patients was between 18 and 90 years old with an average of 58.21 ± 13.69 years. The majority of the population reported NCD as cause of hospitalization (91.40%). Figure 1 represents comorbidity in details.

Subjective global assessment results

Prevalence of malnutrition according to SGA

According to the SGA, 55.24% of inpatients were well-nourished, 19.05% were classified as “B,” moderately malnourished and 25.71% were classified “C”, severely malnourished (Figure 2). The SGA rating was significantly related to the BMI ($r = -0.28$; $p < 0.01$). However, the SGA rating is not significantly related to the BMI ranks of malnutrition (malnourished if $BMI < 18.5 \text{ kg/m}^2$ (30)).

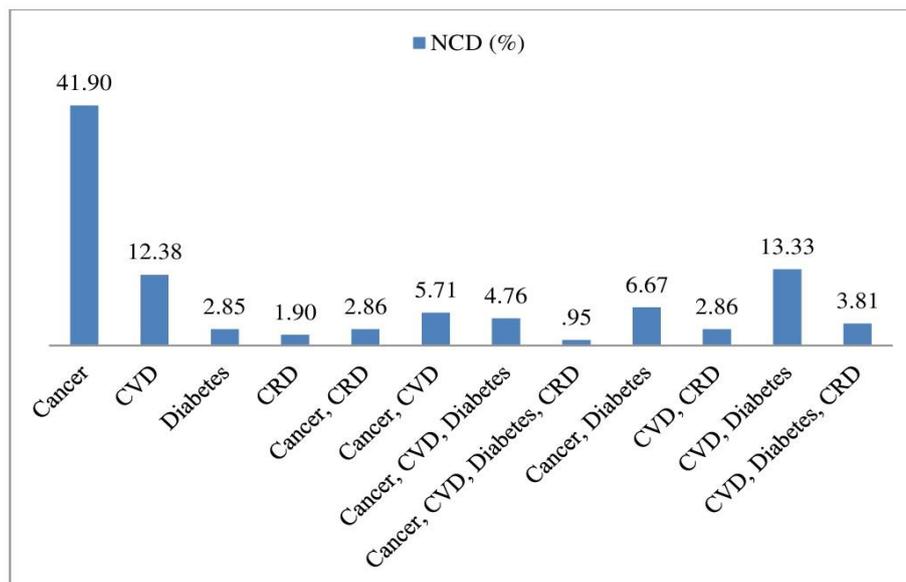


Figure 1. Comorbidities among study population (Skikda-Algeria, 2020)

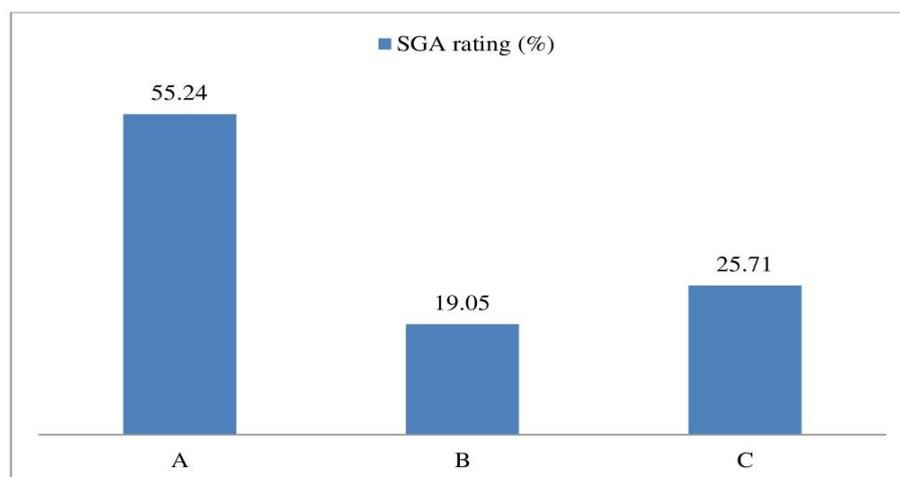


Figure 2. SGA rating results among study population (Skikda-Algeria, 2020)

SGA and hospitalization

The ANOVA test showed that there had not been found a significant difference between the SGA ranks and four hospitalization conditions (NCD type, number of NCDs, comorbidities and cause of hospitalization) ($p>0.05$). However there was a significant difference between the SGA ranks and the LOS ($p=0.013$). The post-hoc analysis using Scheffe's method showed that the group "C" (severely malnourished inpatients) was significantly different from the other two groups of patients. The test of correlation Pearson showed a significant positive correlation between the SGA rating and the LOS ($p=0.05$).

SGA rating and assessment criteria

The Pearson's test presented a significant correlation between the SGA rating and the assessment criteria (nutrient intake, weight loss, functional capacity, physical exam and number of symptoms) ($p=0.01$). The ANOVA test showed that there had been found a significant difference between SGA ranks and the assessment criteria. However, the nutritional intake related-symptoms show no differences. The post hoc analysis showed that the well-nourished group was different in nutrient intake and weight loss, and the severely malnourished group was different in functional capacity and physical exam ($p=0.05$).

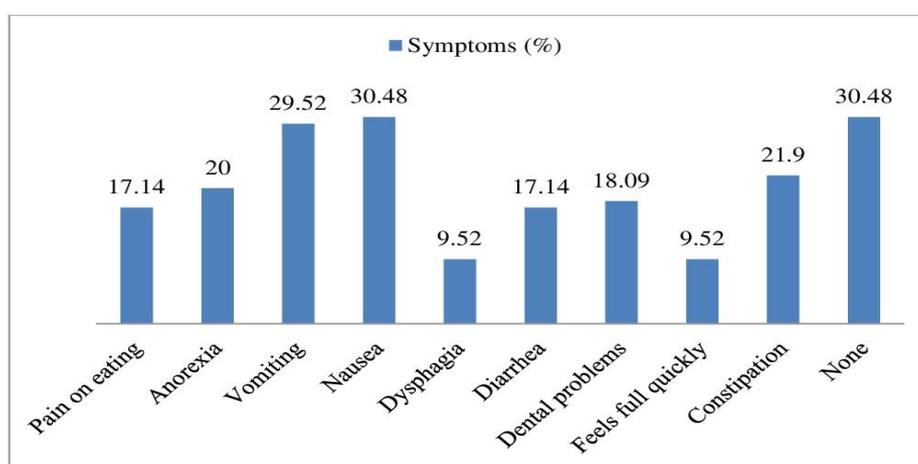


Figure 3. Prevalence of nutritional intake related symptoms among study population (Skikda-Algeria, 2020)

Prevalence of nutritional intake symptoms

The most common nutritional impact symptoms leading to reduced food intake were nausea (30.48%), vomiting (29.52%), constipation (21.90%), and anorexia (20%) (Figure 3). Sixty nine point five percent of patients might have at least one nutritional symptom. More than one of three (38.1%) patients had severe symptoms. More than one-third (33.4%) reported three to seven symptoms. The nutritional impact symptoms "pain on eating, anorexia, vomiting, nausea, feels full quickly" were significantly and negatively related to the nutrient intake.

Discussion

This cross-sectional study allowed us to assess the nutritional status and to estimate the prevalence of malnutrition of NCDs' inpatients at the public hospital Abd errazaq Bouhara in the

city of Skikda (Algeria).

The average age of studied inpatients puts them at risk of early death, as more than 14 million people dying annually between the ages of 30 and 70 due to NCDs (31). NCDs share common lifestyle risk factors, thus the coexistence of two or more diseases in the same person, especially diabetes and heart diseases, which represents metabolic syndrome (32,33). As we mentioned earlier, NCDs are among the main reasons for hospitalization. An increased number of NCDs is associated with a higher utilization of primary and secondary health care services (34) which explains that the majority of studied patients were hospitalized for a direct reason with the NCDs they suffer from.

The SGA allowed us to estimate the malnutrition prevalence at 44.76% (ranks B and C: moderate

and severe malnutrition). Malnutrition effects on average 20 to 50% of hospitalized patients. Its negative repercussions in terms of morbidity and mortality have been well-demonstrated (35). In Spain, 50% of inpatients in a tertiary hospital ($n=197$) were malnourished, according to the SGA (36). In Vietnam, Tran *et al.* found that the prevalence of malnutrition in patients on hospital ($n=883$) was at 48.1% using the SGA or the $BMI < 18.5 \text{ kg/m}^2$ (37). As for our research, we have reservations about using BMI as an indicator of malnutrition. The results we obtained proved that a BMI of more than 18.5 kg/m^2 does not necessarily mean the absence of malnutrition. For values below 18.5 kg/m^2 , different grades of under-nutrition exist. The lower limit of normality of the BMI is higher in the elderly due to the physiological weight gain associated with age. So, beyond the age of 75, there is under-nutrition or risk of malnutrition when the BMI is less than 21 kg/m^2 (35). BMI is an imperfect indicator of percentage fat, but also, it doesn't take into consideration fluid retention that falsely increases body weight measurements (29,38).

Our research indicates that severe malnutrition is associated with a longer LOS, confirming previous studies about malnutrition independently associated with higher mortality risk, longer LOS, and increased hospitalization costs (39). The LOS is a crucial indicator of the efficiency of hospital management. According to the Organization for Economic Co-operation and Development (OECD), the average length of stay in hospitals for all causes across OECD countries was about eight days (40,41). Our study showed a shorter LOS (4.14 ± 7.69 days). Despite the fact that a reduced stay decreased the infection risk and medication side-effects, improved the quality of treatment, and increased hospital profit with more efficient bed management and reduced costs; in our study, this shortest LOS indicates probably an early discharge that could worsen patients' outcomes and promoted chances of readmission. Especially in the absence of effective diagnosis and treatment of hospital malnutrition (40–42).

Our results showed that food intake and weight loss are the most worthy criteria to place our judgment on to assess the nutritional status. Functional capacity and physical exam helped to describe and confirm the degree of the severity of malnutrition. Detsky *et al.* instructed their

clinical raters to place most of their judgment on the variables weight loss, reduced dietary intake, and physical exam (29). Our results confirmed the relationship between nutritional symptoms and reduced nutrient intake. These symptoms could be a result of low quality of life on admission and also side-effects of medications like chemotherapy (43,44).

This study derives its importance from several aspects. Firstly, it is the first to assess the nutritional status of inpatients with NCDs in Algeria. Secondly, despite the presence of some studies that dealt with a specific NCD or a vulnerable group of patients, our research represents a less expensive option. NCDs share many risk factors and are among the most important causes of hospitalization, as we mentioned earlier. Therefore, comprehensive studies provide us an estimated value of the prevalence of malnutrition in hospitals in general. However, more work is needed. Conducting grander studies on larger samples and researches about assessment criteria, mainly nutrient intake and related symptoms, by studying the nature, quality, and quantity of inpatients' food intake is primordial.

The circumstances associated with the Coronavirus spread represented several obstacles that accompanied our research, as we were unable to reach many institutions, which seemed to affect the sampling method, the sample size and its composition. Which explains many of the results, principally the evident difference in the nature of studied NCDs, as cancer patients represented the largest group, and respiratory disease patients the least group, because of the presence of cancer patients in a special ward compared to the other three diseases in the general medicine ward, as well as the transfer of most of patients with respiratory infections to the ancient hospital designated for Coronavirus cases, as they are considered suspected and vulnerable cases. However, our approach aimed to overcome these obstacles, as we chose to conduct a simple stratified random sampling to ensure the representation of every patient group, which allowed us to get a representative sample (45,46)

Conclusion

Our study assessed the nutritional status of a sample of NCDs inpatients. The prevalence of malnutrition among less than half of the patients

was due to reduced food intake and some nutritional impact symptoms; the absence of monitoring by specialists and the LOS considered less than necessary given the nutritional status of patients that require specialized intervention. Accordingly, the nutritional status assessment must be included in the routine of health care in Algeria to understand more the causes of hospital malnutrition and adopt strategic solutions.

Conflicts of interest

None

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