



## Determining of the Nutritional Status of Patients with Gastrointestinal Tract Cancer

### ABSTRACT

**Objectives:** Malnutrition and weight loss are frequent problems in patients with malignant disease, affecting prognosis, length of hospital stay, quality of life, and survival. The aim of this study was to evaluate the nutritional status of patients with gastrointestinal cancer.

**Methods:** The study was conducted in descriptive and cross-sectional design. The study sample consisted of 140 patients with cancer of the gastrointestinal system who met the inclusion criteria. Patients were reached in a 1-year period in 2020-2021. Data were collected with patient information form and Mini Nutritional Assessment Long Form (MNA-LF). Permissions were obtained from the ethics committee of Çankırı Karatekin University and Al-Amal National Hospital for the study. Chi-square test and Two-Way Spearman Correlation Analysis were used in data analysis. Statistical significance was accepted as  $p < 0.05$ .

**Results:** The study results indicate that 49.3% of patients are at risk of malnutrition, 30% of patients have normal nutritional status, and 20.7% of patients are malnourished. There is a statistically significant difference between the social status, economic status and family history of cancer, and the Mini Nutritional Assessment of the patients ( $p < 0.05$ ).

**Conclusion:** It was determined that patients with cancer are at risk of malnutrition. They need frequent nutritional status assessments at regular periods. Providing good care for patients will enhance their nutritional status and prevent health.

**Keywords:** Malnutrition, Cancer, MNA, Nutritional Screening

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## INTRODUCTION

In the twenty-first century, cancer is predicted to be the main source of mortality and the singular more important critical disruption to enhancing the average lifespan across every community on worldwide. Cancer is the fundamental or secondary major reason for demise before reaching seventy years of age in ninety-one of one hundred and seventy-two nations, according to World Health Organization (WHO) estimates from the year 2015, In addition, it is placed 3<sup>rd</sup> or 4<sup>th</sup> in another twenty-two nations (Bray et al., 2018).

Gastrointestinal tract (GIT) cancer, which affects various organs in the system of digestive, including the stomach, esophagus, gall bladder, hepatic system, pancreatic, large and small intestine, anus, and rectum, is utmost frequently diagnosed cancer type in the world, accounting for about a quarter of all cancer cases. According to predictions from the WHO, the global incidence of cancer is anticipated to climb to 21.7 million statuses and 13 million fates by 2030, primarily as a consequence of population expansion and the process of growing old (Garla, Waitzberg, & Tesser, 2018).

GIT cancer is responsible for 26 percent of all new cancer diagnoses and 35 percent of all cancer-related fatalities in the United States. In 2018, there were predicted more than 4.5 million novel statuses of GIT cancer and more than 3 million correlating deaths universally, according to the WHO. The large part of deaths and conditions passed off in Asia come after by Europe and North America, rating for 26% of total cases and 23% of fates together (Arnold et al., 2020).

Patients suffering from GIT cancer are particularly sensitive to malnutrition as a result of the unique characteristics of the disease. This form of cancer has significant effects on the digestive system, including changes in intestinal

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transit, uncontrollable vomiting, and early satiety, all of which have a direct impact on the process of absorption and digestion of food. As a result of these systemic complications, the patient is more susceptible to developing neoplastic cachexia, which is marked by gradual and uncontrollable weight loss that causes the musculoskeletal system to become increasingly compromised, resulting in rapid loss of fatty tissue, atrophy of visceral organs, and depletion of stored energy. Cachexia has the potential to impair the quality of life of patients while also shortening their overall survival (do Prado & Campos, 2015). Patients with malignant neoplastic disease frequently suffer from malnourishment and weight loss, which has negative impacts on their prognosis, duration of hospital stay, cost of healthcare, quality of life, and overall survival (Thoresen et al., 2013).

Patients with gastrointestinal cancer may have weight loss and malnourishment as a result of the disease's involvement in the digestive system, the type of cancer treatment they receive, and the disease's complications and side effects. Furthermore, the elderly are particularly prone to malnutrition due to their reliance on others in their daily activities and their inability to consume a variety of foods. To decrease or prevent risk, it is critical to analyze the nutritional state of this population, recognize any health problems, and provide management to help them. A rapid epidemiological and nutritional transition is taking place around the world, with chronic malnutrition and obesity on the rise. One of the most significant challenges to overcome is a shift in eating habits and lifestyle toward a more nutritious diet and frequent physical activity. Even though this problem has not been resolved in Iraq (Alkhalidi & Alshemerty, 2018). The aim of this study is to determine the nutritional status of patients with GIT cancer in Iraq.

## MATERIAL AND METHODS

### Design

The study was conducted in descriptive cross-sectional type.

### Study Sample

The sample was chosen by using a convenience sample. The researcher approached adults aged 50-65 and seniors aged 65-70 years who were patients diagnosed by physicians with gastrointestinal cancer in the third stage. The research and objective whereas explained to them and data collection began. The study sample comprised 140 patients with GIT cancer. G power package program be used for power analysis. because power analysis, the sampling power at the 0.05 significance level was 0.95.

### Inclusion Criteria

- ✓ Patients diagnosed with GIS cancer in the third stage
- ✓ Patients undergoing chemotherapy, radiotherapy or surgery.
- ✓ Both genders.
- ✓ Be 50 years or older
- ✓ Not have a diagnosis of cognitive illness that would interfere with communication
- ✓ Agree to participate in the study

### Exclusion Criteria

- ✓ A medical diagnosis of cognitive and mental impairment
- ✓ Age younger than 50 years.
- ✓ Refusal to participate.

### Study Instrument and Data Collection

The data were collected in a 1-year period in the years 2020-2021, followed in the hospital. The study tool was a questionnaire used to identify the nutritional status of adults aged 50-65 and seniors aged 65-70 who have GIT cancer. **The instrument includes**

**Patient information form:** The 1<sup>st</sup> part consist of the health and sociodemographic characteristics for participation includes questions about age, gender, education level, residency, status of social, economic status, smoking, drinking alcohol, diagnosis of illness, family history of cancer, type of treatment, and complaints about previous health problems.

**Mini Nutritional Assessment Long Form (MNA-LF):** It was developed in 1994 in collaboration between the Toulouse University, the New Mexico School of Medicine and the Swiss Nestle Research Center (Vellas et al., 2006). The MNA was originally approved in three studies including a total of 600 older participants, and was published by Guigoz et al. in 1994 (Guigoz, Vellas, & Garry, 1997). MNA is commonly used for screening of malnutrition in cancer patients at all ages (Torbahn, Strauss, Sieber, Kiesswetter, & Volkert, 2020). The MNA was tested in accordance with two important requirements. First and foremost, there is the “medical nutritional status. “decision made by two independently trained clinicians, without knowing the MNA results, after evaluating the nutritional status of patients including their clinical record (including comprehensive nutritional assessment). The second is a comprehensive nutritional assessment. Comprehensive nutritional assessment includes detailed anthropometric assessment (height, weight, knee length, mid-arm and calf circumferences, triceps and subscapular subcutaneous thickness); Indicators based on biochemical data (levels of albumin or pre-albumin, creatinine, transferrin, ceruloplasmin, C-reactive protein, alpha-1-acid glycoprotein, values of lipid profile and triglycerides, several types of vitamins including B and others, copper, folate, zinc, rate of hemoglobin, values of blood counts and differentials); and dietary consumption (3-day dietary record collective with food consumption repeated questions). Topics were classified using principal components and discriminant analysis. Exact cut-off rates were determined according cross-tabulation with albumin cut-off values in the absence of inflammation. The long-form MNA consists of 18 components that are organized into four divisions. These four portions are as follows: anthropometric assessment (BMI, weight, arm and calf circumferences); overall assessment (lifestyle, medication, physical functions or mobility, mental impairment symptoms); simple nutritional assessment (numeral of meals, snacks and fluid intake, autonomy in nutrition); and simple self-assessment (self-perception about health and nutrition habitus). The test is a quick method that is completed in about 10-15 minutes. MNA classifies elderly patients as normally fed ( $\geq 24$ ), at risk (between 17-23.5), or markedly malnourished ( $<17$ ). According to the clinical condition, the sensitivity, specificity, and positive predictive values of the test are 96 percent, 98 percent, and 97 percent, respectively, of the total population (Guigoz, 2006; Guigoz et al., 1997). The Arabic version of the MNA was obtained from the Nestle nutrition institute (“Nestlé Nutrition Institute - MNA® Elderly - Nestlé Websites,” n.d.) Some questions are asked related to food reductions over the three months ago, lack of weight, suffering from psychological stress, neuropsychological problems, having the ability to live independently, the use of pharmaceutical medications, sores because to pressure, the amount of full meals consumed on a daily basis, consumption indicators for protein intake (proportional to the amount of milk consumed (milk, cheese, yogurt) during day, portions of beans or eggs consumed each week, & meat, fish, or poultry every day), daily consumption of at least two servings of fruit or vegetables, The amount of fluid consumed (water, juice, coffee, tea, milk...), the style of feeding, and the individual's perception of his or her nutritional state, as well as mobility (Guigoz, 2006; Rubenstein, Harker, Salvà, Guigoz, & Vellas, 2001; Vellas et al., 2006). The Arabic version of the MNA was obtained from the Nestle nutrition institute and many Iraqi studies use the Arabic version of the MNA (Al-Kazrajy, Hammadi, & Al-Kazrajy, 2020; Ibrahim, Khalil, & Tawfeeq, 2019).

### **Anthropometric Measurement**

**Mid-upper arm circumference (MUAC):** The arm was bowed and the mark between the olecranon and acromion handle was checked. When the arm was pendent straight down the tape was covered around the mid-point mark and MUAC was taken.

**Body Mass Index (BMI):** It was computed by dividing the current body weight in kilos by the square of the person's height in meters.

**Calf circumference (CC):** taken at the most extensive midpoint of the calf.

**Weight measurement:** Seca scales were used to measure the weight of the study participants.

**Height measurement:** Height for participants was taken withstanding with their backbacksinst the measuring board, shoulders heels, buttocks, heels, and head contacting a flat upright sliding headpiece. The leg section participants were placed side by side with the knees and ankles touching. Measurement of height was taken at the maximum revelation and the height was recorded to the nearest 0.1 cm.

### **Statistical Analysis**

The data were analyzed using the IBM SPSS Version 22.0 program. For the analysis of descriptive data, mean $\pm$ standard deviation and frequency are given. Categorical variables were analyzed with the chi-square test. Statistical significance between quantitative variables and the correlation coefficient was calculated with the “Two-Way Spearman Correlation Analysis”. Statistical significance was accepted as  $p < 0.05$ .

### **Ethics**



Ethics committee number 21 dated 25.08.2021 was obtained from the ethics committee of Çankırı Karatekin University for the study. The research was also approved by the Iraq Ministry of Health by an administrative order directed to the medical city/Baghdad (Al-Amal National Hospital, Oncology Hospital, Gastroenterology and Hepatology Teaching Hospital). The researcher explained the study and the objectives to the sample, then asked them to provide their verbal agreement to participate in the study, and after this began to gather the data.

## RESULTS



Table (1) shows that 27.9% of patients were aged 66-70 years, 60% were male, 35% were illiterate, 35% were suburban residents, 75.7% were married, 43.6% had barely adequate monthly income, 79.3% did not smoke, 85.7% did not drink, 31.4% had gastric cancer, 57.9% had no family history of cancer, 29.3% received combination therapy, and 52.1% complained of previous health problems.

**Table 1:** Distribution of sociodemographic characteristics of the sample (n=140)

| Variables                              |                     | n    | %    |
|--|---------------------|------|------|
| Age                                    | 50-55               | 31   | 22.1 |
|  | 56-60               | 35   | 25   |
|  | 61-65               | 35   | 25   |
|  | 66-70               | 39   | 27.9 |
| Gender                                 | Female              | 56   | 40   |
|  | Male                | 84   | 60   |
| Education                              | Illiterate          | 49   | 35   |
|  | Literate            | 28   | 20   |
|  | Elementary          | 18   | 12.9 |
|  | Middle School       | 19   | 13.6 |
|  | College             | 11   | 7.8  |
|  | University          | 10   | 7.1  |
| Resident                               | Postgraduate        | 5    | 3.6  |
|  | Rural               | 45   | 32.1 |
|  | Suburban            | 49   | 35   |
| Social status                          | Urban               | 46   | 32.9 |
|  | Divorced            | 11   | 7.8  |
|  | Married             | 106  | 75.7 |
|  | Single              | 6    | 4.3  |
| Economic status                        | Widowed             | 17   | 12.2 |
|  | Adequate            | 50   | 30.7 |
|  | Barely adequate     | 61   | 43.6 |
| Smoking                                | Inadequate          | 29   | 20.7 |
|  | No                  | 111  | 79.3 |
| Drinking                               | Yes                 | 29   | 20.7 |
|  | No                  | 120  | 85.7 |
| Diagnosis of illness                   | Yes                 | 20   | 14.3 |
|  | Cholangiocarcinoma  | 10   | 7.1  |
|  | Colorectal cancer   | 15   | 10.7 |
|  | Duodenal cancer     | 21   | 15   |
|  | Esophageal cancer   | 10   | 7.1  |
|  | Gastric cancer      | 44   | 31.4 |
|  | Liver cancer        | 20   | 14.3 |
| Pancreatic cancer                      | 20                  | 14.3 |      |
| Family history of cancer               | No                  | 81   | 57.9 |
|  | Yes                 | 59   | 42.1 |
| Type of treatment                      | Chemotherapy        | 32   | 22.8 |
|  | Combination therapy | 41   | 29.3 |
|  | Radiotherapy        | 27   | 19.3 |
|  | Surgical            | 40   | 28.6 |
| Complaints of previous health problems | No                  | 67   | 47.9 |
|  | yes                 | 73   | 52.1 |

The results show that 69 (49.3%) patients were at risk of malnutrition, 42 (30%) patients have normal nutritional status, and 29 (20.7%) patients were malnourished. For measurements, 46.4% had mid-upper arm circumference of 21-22 cm, 81.4% had calf circumference of 31 cm and more, 76.4% were mobile outside the house and 11.4% of the patients had a BMI less than 19 (Table 2).

**Table 2:** Distribution of MNA score and Anthropometric measurements among patients with cancer(n=140)

| Measurements  | n   | %   |
|---|---|---|
|  <a href="http://sssjournal.com">sssjournal.com</a> | International Social Sciences Studies Journal |  <a href="mailto:sssjournal.info@gmail.com">sssjournal.info@gmail.com</a> |

| <b>BMI results</b>                    |     |      |
|---------------------------------------|-----|------|
| BMI < 19                              | 16  | 11.4 |
| BMI 19 to < 21                        | 32  | 22.9 |
| BMI 21 to < 23                        | 47  | 33.6 |
| BMI 23 or more                        | 45  | 32.1 |
| <b>MUAC values in cm</b>              |     |      |
| MUAC less than 21                     | 12  | 8.6  |
| MUAC 21 to 22                         | 65  | 46.4 |
| MUAC greater than 22                  | 63  | 45.0 |
| <b>CC values in cm</b>                |     |      |
| Less than 31                          | 26  | 18.6 |
| 31 or great                           | 114 | 81.4 |
| <b>MNA categories</b>                 |     |      |
| Normal nutritional status (24-30)     | 42  | 30.0 |
| At the risk of malnutrition (17-23.5) | 69  | 49.3 |
| Malnourished (less than 17)           | 29  | 20.7 |

**Table 3:** Causes of malnutrition in patients with cancer(n=140)

| Variables   | n   | %    |
|---|-----|------|
| <b>1- Food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties</b> |     |      |
| Severe decrease in food intake  | 25  | 17.9 |
| Moderate decrease in food intake  | 49  | 35.0 |
| No decrease in food intake  | 66  | 47.1 |
| <b>2- Weight loss during the last 3 months</b>  |     |      |
| Weight loss greater than 3 kg   | 17  | 12.1 |
| Does not know   | 33  | 23.6 |
| Weight loss between 1 and 3 kg  | 54  | 38.6 |
| No weight loss  | 36  | 25.7 |
| <b>3- Suffered psychological stress or acute disease in the past 3 months</b>   |     |      |
| Yes   | 41  | 29.3 |
| No  | 99  | 70.7 |
| <b>4- Neuropsychological problems</b>   |     |      |
| Severe dementia or depression   | 13  | 9.3  |
| Mild dementia   | 47  | 33.6 |
| No psychological problems   | 80  | 57.1 |
| <b>5- Lives independently (not in a nursing home or hospital)</b>   |     |      |
| No  | 20  | 14.3 |
| Yes   | 120 | 85.7 |
| <b>6- Takes more than three prescription drugs per day</b>  |     |      |
| Yes   | 55  | 39.3 |
| No  | 85  | 60.7 |
| <b>7- Pressure sores or skin ulcers</b>   |     |      |
| Yes   | 20  | 14.3 |
| No  | 120 | 85.7 |
| <b>8- Number of full meals eaten every day</b>  |     |      |
| One meal  | 20  | 14.3 |
| Two meals   | 50  | 35.7 |
| Three meals   | 70  | 50.0 |
| <b>9- Selected consumption markers for protein intake:</b>  |     |      |
| <b>A- At least one serving of dairy products (milk, cheese, yogurt) per day</b>   |     |      |
| No  | 32  | 22.9 |
| Yes   | 108 | 77.1 |
| <b>B- Two or more servings of legumes or eggs per week</b>  |     |      |
| No  | 23  | 16.4 |
| Yes   | 117 | 83.6 |
| <b>C- Meat, fish, or poultry every day</b>  |     |      |
| No  | 63  | 45.0 |
| Yes   | 77  | 55.0 |
| <b>10- Consumes two or more servings of fruit or vegetables per day</b>   |     |      |
| No  | 61  | 43.6 |
| Yes   | 79  | 56.4 |
| <b>11- Amount of fluid (water, juice, coffee, tea, milk...)</b>   |     |      |
| Less than 3 cups  | 7   | 5.0  |
| 3 to 5 cups   | 70  | 50.0 |
| More than 5 cups  | 63  | 45.0 |
| <b>12- Mode of feeding</b>  |     |      |
| Unable to eat without assistance  | 14  | 10.0 |
| Self-fed with some difficulty   | 52  | 37.1 |

|  |     |      |
|--|-----|------|
| Self-fed without any problem   | 74  | 52.9 |
| <b>13- Self-view of nutritional status</b>   |     |      |
| Views self as being malnourished   | 22  | 15.7 |
| Is uncertain of nutritional state  | 56  | 40.0 |
| Self as having no nutritional problem  | 62  | 44.3 |
| <b>14- Compared with other people of the same age, the patient considers their health status</b> |     |      |
| Not as good  | 16  | 11.4 |
| Does not know  | 34  | 24.3 |
| As good  | 41  | 29.3 |
| Better   | 49  | 35.0 |
| <b>15- Ability to move (mobility)</b>  |     |      |
| Bed- or chair-bound  | 5   | 3.6  |
| Able to get out of bed/chair but does not  | 28  | 20.0 |
| Goes out   | 107 | 76.4 |

The findings in table 3 revealed that 47.1% of patients had no decrease in food intake and others had a moderate to severe decrease in food intake. Of patients, 38.6 had lost 1-3 kg and 17.9% lost more than 3 kg during the last three months. Among patients, 70.7% had not suffered from psychological stress, 57.1% did not have psychological problems and others had moderate to severe dementia. Of the patients, 33.6% had a body mass index of 21-23, 85.7% lived independently, 60.7% do not take more than 3 drugs per day, and 85.7% had no skin ulcers. In terms of eating, 50% ate three meals every day and the other half ate 1-2 meals per day. Among patients, 77.1% ate at least one item of dairy products (milk, cheese, yogurt) per day, 83.6% ate more than 2 servings of legumes or eggs per week, 55% ate meat, fish, or poultry every day, 56.4% consumed two or more servings of fruit or vegetables per day, 50% drank 3-5 cups of fluid and 45% drank more than 5 cups. For feeding, 52.9% self-fed without any problem and the other patients had difficulty. Of the patients, 44.3% had no nutritional problems and 29.3% and 35% had good to better health status.

**Table 4:** The distribution between patients' MNA score and socio-demographic characteristics (n=140)

| Variables     |            | n:140 | Malnourished (n=29) | At risk (n=69) | Normal (n=42) | P-value | Test value |
|---------------|------------|-------|---------------------|----------------|---------------|---------|------------|
| Age           | 50-55      | n     | 31                  | 4              | 13            | 0.304   | 7.186      |
|               |            | %     | 22.1                | 2.9            | 9.3           |         |            |
|               | 56-60      | n     | 35                  | 7              | 18            |         |            |
|               |            | %     | 25                  | 5.0            | 12.9          |         |            |
|               | 61-65      | n     | 35                  | 6              | 19            |         |            |
|               |            | %     | 25                  | 4.3            | 13.6          |         |            |
|               | 66-70      | n     | 39                  | 12             | 19            |         |            |
|               |            | %     | 27.9                | 8.6            | 13.6          |         |            |
| Gender        | Female     | n     | 56                  | 10             | 32            | 0.314   | 2.315      |
|               |            | %     | 40                  | 7.1            | 22.9          |         |            |
|               | Male       | n     | 84                  | 19             | 37            |         |            |
|               |            | %     | 60                  | 13.6           | 26.4          |         |            |
| Education     | Illiterate | n     | 49                  | 8              | 28            | 0.556   | 10.690     |
|               |            | %     | 35                  | 5.7            | 20.0          |         |            |
|               | Literate   | n     | 28                  | 4              | 13            |         |            |
|               |            | %     | 20                  | 2.9            | 9.3           |         |            |
|               | Elementary | n     | 18                  | 5              | 9             |         |            |
|               |            | %     | 12.9                | 3.6            | 6.4           |         |            |
|               | Secondary  | n     | 19                  | 3              | 11            |         |            |
|               |            | %     | 13.6                | 2.1            | 7.9           |         |            |
|               | Associate  | n     | 11                  | 4              | 4             |         |            |
|               |            | %     | 7.9                 | 2.9            | 2.9           |         |            |
|               | Graduate   | n     | 10                  | 4              | 3             |         |            |
|               |            | %     | 7.1                 | 2.9            | 2.1           |         |            |
| Post-graduate | n          | 5     | 1                   | 1              |               |         |            |
|               | %          | 3.6   | 0.7                 | 0.7            |               |         |            |
| Resident      | Rural      | n     | 45                  | 7              | 25            | 0.503   | 3.339      |
|               |            | %     | 32.1                | 5.0            | 17.9          |         |            |
|               | Suburban   | n     | 49                  | 13             | 24            |         |            |
|               |            | %     | 35                  | 9.3            | 17.1          |         |            |
|               | Urban      | n     | 46                  | 9              | 20            |         |            |
|               |            | %     | 32.9                | 6.4            | 14.3          |         |            |
| Social status | Divorced   | n     | 11                  | 3              | 7             | 0.005*  | 18.555     |
|               |            | %     | 7.9                 | 2.1            | 5.0           |         |            |
|               | Married    | n     | 106                 | 15             | 53            |         |            |
|               |            | %     | 75.7                | 10.7           | 37.9          |         |            |
|               |            |       |                     |                |               |         |            |
|               |            |       |                     |                |               |         |            |

|  |                     |      |      |      |      |      |        |        |
|--|---------------------|------|------|------|------|------|--------|--------|
|  | Single              | n    | 6    | 2    | 2    | 2    |        |        |
|  |                     | %    | 4.3  | 1.4  | 1.4  | 1.4  |        |        |
|  | Widowed             | n    | 17   | 9    | 7    | 1    |        |        |
|  |                     | %    | 12.1 | 6.4  | 5.0  | 0.7  |        |        |
| Economic status                        | Sufficient          | n    | 50   | 9    | 28   | 13   | 0.016* | 12.213 |
|  |                     | %    | 35.7 | 6.4  | 20.0 | 9.3  |        |        |
|  | Hardly              | n    | 61   | 16   | 32   | 13   |        |        |
|  |                     | %    | 43.6 | 11.4 | 22.9 | 9.3  |        |        |
|  | Insufficient        | n    | 29   | 4    | 9    | 16   |        |        |
|  |                     | %    | 20.7 | 2.9  | 6.4  | 11.4 |        |        |
| Smoking                                | No                  | n    | 111  | 24   | 55   | 32   | 0.792  | 0.466  |
|  |                     | %    | 79.3 | 17.1 | 39.3 | 22.9 |        |        |
|  | Yes                 | n    | 29   | 5    | 14   | 10   |        |        |
|  |                     | %    | 20.7 | 3.6  | 10.0 | 7.1  |        |        |
| Drinking                               | No                  | n    | 120  | 25   | 61   | 34   | 0.551  | 1.192  |
|  |                     | %    | 85.7 | 17.9 | 43.6 | 24.3 |        |        |
|  | Yes                 | n    | 20   | 4    | 8    | 8    |        |        |
|  |                     | %    | 14.3 | 2.9  | 5.7  | 5.7  |        |        |
| Cancer type                            | Colorectal          | n    | 10   | 2    | 4    | 4    | 0.787  | 7.980  |
|  |                     | %    | 7.1  | 1.4  | 2.9  | 2.9  |        |        |
|  | Colorectal          | n    | 15   | 4    | 8    | 3    |        |        |
|  |                     | %    | 10.7 | 2.9  | 5.7  | 2.1  |        |        |
|  | Duodenal            | n    | 21   | 3    | 12   | 6    |        |        |
|  |                     | %    | 15.0 | 2.1  | 8.6  | 4.3  |        |        |
|  | Esophageal          | n    | 10   | 1    | 6    | 3    |        |        |
|  |                     | %    | 7.1  | 0.7  | 4.3  | 2.1  |        |        |
|  | Gastric             | n    | 44   | 7    | 20   | 17   |        |        |
|  |                     | %    | 31.4 | 5.0  | 14.3 | 12.1 |        |        |
|  | Liver               | n    | 20   | 5    | 11   | 4    |        |        |
|  |                     | %    | 14.3 | 3.6  | 7.9  | 2.9  |        |        |
| Pancreatic                             | n                   | 20   | 7    | 8    | 5    |      |        |        |
|  | %                   | 14.3 | 5.0  | 5.7  | 3.6  |      |        |        |
| Family history of cancer               | Yes                 | n    | 81   | 23   | 35   | 23   | 0.029* | 7.079  |
|  |                     | %    | 57.9 | 16.4 | 25.0 | 16.4 |        |        |
|  | No                  | n    | 59   | 6    | 34   | 19   |        |        |
|  |                     | %    | 42.1 | 4.3  | 24.3 | 13.6 |        |        |
| Type of treatment                      | Chemotherapy        | n    | 32   | 10   | 14   | 8    | 0.387  | 6.334  |
|  |                     | %    | 22.9 | 7.1  | 10.0 | 5.7  |        |        |
|  | Combination therapy | n    | 41   | 8    | 19   | 14   |        |        |
|  |                     | %    | 29.3 | 5.7  | 13.6 | 10.0 |        |        |
|  | Radiotherapy        | n    | 27   | 6    | 16   | 5    |        |        |
|  |                     | %    | 19.3 | 4.3  | 11.4 | 3.6  |        |        |
|  | Surgical            | n    | 40   | 5    | 20   | 15   |        |        |
|  |                     | %    | 28.6 | 3.6  | 14.3 | 10.7 |        |        |
| Complaints of previous health problems | No                  | n    | 67   | 12   | 37   | 18   | 0.401  | 1.828  |
|  |                     | %    | 47,9 | 8,6  | 26,4 | 12,9 |        |        |
|  | yes                 | n    | 73   | 17   | 32   | 24   |        |        |
|  |                     | %    | 52,1 | 12,1 | 22,9 | 17,1 |        |        |

The findings indicated that there were significant statistical relationships between the MNA of patients with social status at p-value 0.005, economic status at p-value 0.016, and family history of cancer at p-value 0.029. Also, there were no significant statistical correlations between the MNA of patients with age, gender, education, resident, smoking, drinking, diagnosis of illness, type of treatment, and complaint of previous health problems (Table 4).

**Table 5:** Correlations between MNA, weight, BMI, MUAC and calf circumference

| Spearman's rho | MNA | Weight | BMI | MUAC | Calf circumference |
|----------------|-----|--------|-----|------|--------------------|
|----------------|-----|--------|-----|------|--------------------|

|                    |   |   |       |        |       |       |
|--------------------|---|---|-------|--------|-------|-------|
| MNA                | r | 1 | .345* | .393*  | .290* | .271* |
|                    | p |   | .000  | .000   | .001  | .001  |
| Weight             | r |   | 1     | .907** | -.027 | .034  |
|                    | p |   |       | .000   | .750  | .689  |
| BMI                | r |   |       | 1      | -.034 | .028  |
|                    | p |   |       |        | .693  | .738  |
| MUAC               | r |   |       |        | 1     | -.027 |
|                    | p |   |       |        |       | .751  |
| Calf circumference | r |   |       |        |       | 1     |
|                    | p |   |       |        |       |       |

\*p<0.01 Spearman's rho correlation test

There were highly significant correlations between MNA and weight, BMI, MUAC and calf circumference at P values 0.000,0.000, 0.001, & 0.001, respectively (Table 5). The current study observed significantly lower BMIs, MUAC and CC among the malnourished patients compared with those who had well nutritional condition and were at malnutrition risk (Table 6).

**Table 6:** Comparisons between nutritional status, BMI, MUAC & CC

| Variables | Malnourished | At risk of Malnourished | Normal status | P value |
|-----------|--------------|-------------------------|---------------|---------|
| BMI       | 19.74±2.76   | 24.45±4.74              | 25.41±9.21    | 0.00    |
| MUAC      | 21.54±1.50   | 21.94±0.930             | 22.47±0.914   | 0.00    |
| CC        | 30.04±2.62   | 30.89±3.89              | 32.28±1.610   | 0.00    |

Abbreviations; CC: calf circumference, BMI: body mass index, MUAC: mid-upper arm circumference.

## DISCUSSION

This is present the first study in Iraq about the nutritional status of known cancer patients. Although the malnourished rate was 20.7% in the current study, 49.3% of patients were at risk of malnutrition. In a large-scale study of 44,3061 cancer patients, 72.7% of the patients were identified as malnourished or at risk of nutritional deficiencies (D'Almeida et al., 2020). In a descriptive study carried out in Syria, the findings indicated that 40.8% of patients had normal nutritional status, 39.8% were at malnutrition risk, and 19.4% were malnourished (Hallaj, 2015). In a study conducted with adult individuals with hematological cancer in Turkey, 55.7% were found to be at risk of malnutrition (Özel & Alphan, 2019). In their study, Çınar et al. stated that according to the MNA screening tool, 57.4% of participants had malnutrition, 27.8% had malnutrition risk and 14.8% had adequate nutrition (Çınar, Yasemin, & Enginyurt). In another study, patients were divided into three groups according to the MNA score: 29.4% were well-nourished, 46.1% were at risk of malnutrition, and 24.5% were malnourished. Weight loss of more than 10 kg in the preceding six months was observed in the last group, which was associated with reduced food intake due to sickness, dyspepsia, and early satiety in the preceding 6 months (Daniele et al., 2017). In a retrospective study, the findings indicated that 82.5% of the patients were malnourished (Pérez-Cruz & Camacho-Limas, 2017). In a case-control study, 65.22% of participants with GIC had moderate malnutrition and 21.74% had severe malnutrition (Jamshidi, Hejazi, & Zimorovat, 2018). A cross-sectional study conducted in Brazil revealed that 23.3% of patients were well-nourished, 56.7 % were considered to be moderately malnourished or suspected to be malnourished, while 20 % were considered to be extremely malnourished (Ferigollo, Bazzan, Ceni, & Bohrer, 2018).

In a descriptive study conducted in Iraq, 40.2% of participants were malnourished, 35.2% were at risk of malnutrition and 24.6% had normal nutritional status (Ibrahim et al., 2019). In a cross-sectional study conducted in Baghdad, 76% of the elderly had normal nutritional status, 20.7% were at malnutrition risk, and 3.3% were malnourishments (Al-Kazrajy et al., 2020). Studies confirm that the incidence of malnutrition is between 25% and 85%, especially in individuals with cancer. There are many factors associated with malnutrition. In the current study, a statistical difference was found between social status, economic status and family history, with MNA scores (p<0.05). Also, there was no significant statistical relationships between the MNA of patients with age, gender, education, resident, smoking, drinking, diagnosis of illness, type of treatment, and complaint of previous health problems. D'Almeida and et al. female sex, age, hospitalization in the southern portion of the country, and the existence of hematological cancers or tumors in the head, neck, upper GIT, and chest were all found to be linked with malnutrition (D'Almeida et al., 2020). Hallaj (2015) found that there was a significant statistical relationship between the MNA of patients with age, education, and source of income (Hallaj, 2015). Similarly, Ibrahim et al. (2019) found that there was a significant statistical correlation between the MNA of patients with



gender. In the study by Tanjani et al., women were more malnourished or at risk of malnutrition compared to men (Ibrahim et al., 2019).

The duration of stay in hospitalization increased notably as nutritional status become progressively worse, and there was also an important reduction in BMI and CC among malnourished patients, parallel to well-nourished patients and patients at nutritional risk. Among patients, 18.4% had CC less than 31, 8.6% had MUAC less than 21 and 11.4% had BMI less than 19. A study in Brazil found 8.7% of patients had CC less than 31 and 18.2% had BMI less than 19 (D'Almeida et al., 2020). Hallaj (2015) found that patients had BMI of 22 kg/m<sup>2</sup>, CC 32.5 cm, and MUAC 24.4 cm (Hallaj, 2015). In another study, the findings indicated that patients with GIT cancer had body mass index of 20.53 kg/m<sup>2</sup>, MUAC of 27.49 cm, and CC of 30.88 cm. (Jamshidi et al., 2018) The findings of a cross-sectional validation study revealed that body mass index was 24.03 and mid-upper arm circumference was 25.15 (do Prado & Campos, 2015). Christian et al (2017) found that 96% of patients had weight loss and 75.5% of patients had some activity limitation (Pérez-Cruz & Camacho-Limas, 2017). In these studies, it was observed that utmost of participant's had BMIs over the malnutrition values (D'Almeida et al., 2020). According to MNA-SF, BMI, and CC values, there were significant decreases bad nutritional status, which is coordinated with a past study of lung cancer patients (Ye et al., 2018). Al-Kazrajy et al (2020) found that 73% of patients ate three meals, 79.67% ate dairy products every day, 67.7% ate 2 serving fruits in a day, 52% consumed more than 5 cups of fluid, and 85.3% viewed themselves as being malnourished (Al-Kazrajy et al., 2020). An adequate and balanced diet should be maintained during cancer treatment as it contributes to a decrease in the risk of infection, faster recovery, milder recovery from side effects that may arise from treatment, provides sufficient energy and strength, maintains the body's energy stores and weight, ensure the patient feels better and increases the quality of life (Kara, 2015). Insufficient consumption of macronutrients may be closely related to mortality levels that may occur within a few weeks in patients (Parlak & Saka, 2017).

## CONCLUSION

In conclusion, malnutrition, and nutritional risk are prevalent in Iraqi cancer patients who are admitted to hospitals for treatment. According to these findings, it is necessary to give priority to appropriate nutrition management. Thus, attention is drawn to the urgent need for early nutritional screening to aid in the reduction of mortality, the improvement of quality of life, and the reduction of hospital expenditures, particularly because these patients have lengthy hospital admissions.

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