ORIGINAL ARTICLE

Effect of Nutritional Status on Quality Of Life of Hepatocellular Carcinoma Patients: A Cross-Sectional Study

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Abstract

Background: ***Patients with advanced cancer frequently suffer from malnutrition, which is related to a poor treatment response and a crucial reduction in quality of life (QOL). However, there is little evidence studying the relationship between QOL and malnutrition in HCC patients.***

Aim of study: ***To evaluate the relation between the nutritional status and quality of life of Egyptian HCC patients at the outpatient clinic at National Liver Institute Hospital, Menoufia University.***

Patients and methods: ***200 HCC patients were involved in this analytical cross-sectional study from the outpatient clinics at the National Liver Institute. Body Mass Index (BMI), Mid Muscle Arm Circumference (MMAC), Mid Arm Circumference (MAC), Calf Circumference (CC), Hand Grip Strength (HGS), Adductor Pollicis Muscle (APM) thickness, Mini-nutritional Assessment (MNA), and Subjective Global Assessment (SGA) Questionnaire were used to assess nutritional status. The Core Quality of Life questionnaire (EORTC QLQ-C30), developed by the European Organization for Research and Treatment of Cancer, was used to measure QOL.***

Results: ***High statistical significant association was found between the domains of EORTC QLQ-C30 and different nutritional assessment tools. Nutritional status is a predictive factor for QOL.***

Conclusions: ***There is a highly statistically significant correlation between nutrition status assessment methods and QOL of HCC patients. Nutritional status determines QOL in HCC patients more than child classification and the Barcelona Clinic Liver Cancer (BCLC) stage.***

Keywords: Hepatocellular carcinoma; Nutritional status; quality of life

1. Introduction

Hepatocellular carcinoma (HCC) accounts for 90% of primary liver cancer.[1] Globally, HCC has become a leading cause of cancer deaths and threatens to have a significant impact on the health system.[2] In Egypt, HCC accounts for 33.63 % of all malignancies in males and 13.54% in females.[3]

Patients with cirrhosis often have poor nutritional status, which has a detrimental effect on their clinical course.[4] Patients with cirrhotic HCC frequently have impaired nutritional status.[5] Malnutrition elevates the risk of comorbidities, shortens survival times, increases the risk of mortality, prolongs periods of hospital stays, elevates costs of health care, and reduces quality of life.[6] Additionally, it also reduces cancer treatment efficacy, impairs response rates, decreases tolerance to treatment, and increases treatment toxicity.[7]

Patients with advanced cancer frequently have malnutrition, which is linked to a poor response to treatment and a marked decrease in QOL.[8] HCC patients' quality of life may be enhanced by accurate nutritional assessment, early detection of malnutrition, and adoption of a suitable and specialized nutritional program.[9]

Cancer patients' nutritional status can be assessed by anthropometric measurements, Subjective Global Assessment10, and biochemical indicators.[11] Questionnaires are used to evaluate cancer patients' quality of life.[12]

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QOL assessment in oncology patients provides data about how nutritional support and malnutrition affect this population. So our study aimed to find out the relation between nutritional status and Egyptian HCC patients' quality of life to help them with their clinical course, prognosis, and overall life.

2. Patients and methods

This analytical cross-sectional study enrolled 200 HCC patients by non random convenience sampling method from hepatology outpatient clinics at the National Liver Institute Hospital; Menoufia University between March 2022 and March 2023. National Liver Institute institutional review board (NLI IRB 00277) has approved study protocol. All participants gave informed consent after explaining the study's objectives.

Sample size estimation: Epi-Info software was used to calculate the sample size. It was assumed that total population = 1000, Prevalence rate = 80%, Error = 5%, Design effect = 2, Cluster = 1. Sample size at confidence level 80% was 190 and increased to be 200 for potential missing data, ensure completeness of analysis, and enhance the study's generalizability.

Inclusion criteria: Adults (>18 years)-conscious patients with no communication disorders, diagnosed with HCC due to various etiologies, and who agreed to be involved in our study.

Exclusion criteria: Patients with malignancies other than HCC, patients taking part in a dietary program or physical activity in the trial for increasing body weight, patients who were physically and mentally unable to participate, and those who did not agree to take part in this study.

Data Collection and Measurement tool:

Each patient was interviewed and asked for socio-demographic data, such as age, gender, residence, occupation, and smoking. Patient clinical data, such as hepatitis status, patients' other comorbidities, child classification, and HCC treatment, were also collected from patient records. BCLC staging was identified with the help of a hepatologist. Nutritional status was assessed by BMI, MAC, MMAC, CC, HGS, APM thickness, SGA, and MNA score. EORTC QLQ-C30 version 3 was utilized to evaluate QOL.

Assessment of nutritional status: different tools were utilized to determine the nutritional status:

Body Mass Index (BMI) has been determined using the formula: BMI = weight (kg) / height (m) squared. Inelastic tape wrapped firmly around the midway between the acromion process of the shoulder blade and the olecranon process of the ulna of the non-dominant arm was used to evaluate Mid-arm circumference (MAC). Mid Muscle Arm Circumference (MMAC) was calculated using the formula: MMAC (cm) = AC (cm) - π x [TSF (mm) ÷ 10]. Tape was used to measure Calf circumference (CC) at the widest part.

Hand grip strength (HGS) was evaluated by a mechanical hand grip dynamometer for three successive measurements with a one-minute break between trials in the non-dominant hand. Adductor pollicis muscle (APM) thickness was assessed by a scientific skinfold caliper.

Two questionnaires were used in determining the nutritional status of our patients: a Mini Nutritional Assessment Questionnaire (MNA) and Subjective Global Assessment (SGA) questionnaire.

Assessment of Quality of Life: EORTC QLQ-C30 version 3 was utilized to determine patients' QOL. It is arranged in six single items and nine scales. The Global Quality of Life (GQL) is the average of questions 29 and 30 of EORTC QLQ-C30. The Global Functional Status (GFS) is the average of 5 functioning scales (role, physical, cognitive, emotional, and social), and three symptoms (fatigue, pain, and nausea or vomiting) scale, the six distinct items about specific symptoms: appetite loss, dyspnea, Insomnia, diarrhea and constipation, and one question addressing the financial impact of the disease. All answers were converted into scores that range from 0 to 100 on a scale according to the EORTC scoring manual.

Statistical analysis:

Statistical Package for Social Sciences (SPSS program) (version 22.0) was utilized for statistical analysis, in which a p-value < 0.05 was considered significant. Quantitative data were shown as mean, standard deviation, median, and range, while qualitative data were expressed as frequency and percent. Spearman's correlation test assessed the strength of associations between different nutritional assessment methods and domains of EORTC QLQ-C30. Multivariate linear regression was utilized to determine the association between domains of QOL and nutritional assessment methods.

3. Results

This figure showed the sociodemographic characteristics and medical status of studied HCC patients. Figure 1.

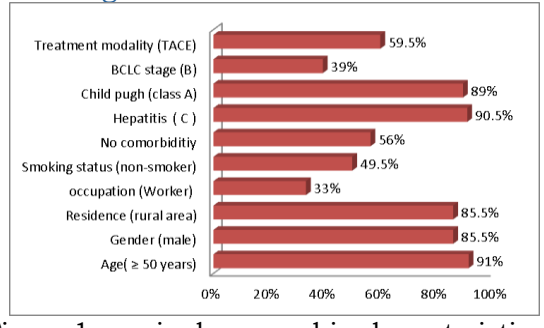

Figure 1. socio-demographic characteristics and medical status of studied HCC patients.

This table described EORTC QLQ C-30 of patients studied. It indicated an average global quality of life (GQL) of (49.91±17.74). The average score of the 5 functional scales was (69.22 ± 16.41).Regarding symptom scales, the average was (26.52±15.02). Table 1

Table 1. Quality of life scores of the studied HCC patients

DOMAINS OF EORTC QLQ-C30 QUESTIONNAIRE	Mean± SD	RANGE
GLOBAL QUALITY OF LIFE(GQL) {Q29&Q30}	49.91±17.74	(0-83.33)
GLOBAL FUNCTIONAL STATUS(GFS)	69.22± 16.41	(16-100)
PHYSICAL FUNCTIONING {Q1-Q5}	70.1± 19.66	(13.33-100)
ROLE FUNCTIONING {Q6&Q7}	65.5±26.39	(0-100)
EMOTIONAL FUNCTIONING {Q21-Q24}	69.91±27.31	(0-100)
COGNITIVE FUNCTIONING{Q20&Q25}	89.91± 16.36	(33.33-100)
SOCIAL FUNCTIONING{Q26&27}	50.66± 22.28	(0-100)
SYMPTOM SCALES	26.52±15.02	(0-77.78)
FATIGUE{Q10&Q12&Q18}	33.77±25.81	(0-100)
NAUSEA AND VOMITING{Q14&15}	9.83±19.64	(0-100)
PAIN {Q9&19}	26.13±23.33	(0-100)
DYSPNEA {Q8}	22±26.82	(0-100)
INSOMNIA {Q11}	22±29.24	(0-100)
APPETITE LOSS {Q13}	30.83±31.33	(0-100)
CONSTIPATION{Q16}	10.49±20.75	(0-100)
DIARRHEA {Q17}	15.66±28.14	(0-100)
FINANCIAL DIFFICULTIES{Q18}	70.33±25.84	(0-100)

This table showed a high statistically significant correlation between nutritional assessment tools and domains of QOL (p = 0.0001). Table 2

Table 2.correlation of quality of life domains with nutritional assessment methods

NUTRITIONAL ASSESSMENT METHOD	GLOBAL QUALITY OF LIFE (GQL)	GLOBAL FUNCTIONAL STATUS (GFS)	SYMPTOMS SCALE
BODY MASS INDEX (BMI)	rs= 0.29	rs= 0.31	rs=-0.29
MID ARM CIRCUMFERENCE (MAC)	rs= 0.34	rs= 0.42	rs= -0.43
TRICEPS SKIN FOLD (TSF)	rs= 0.33	rs= 0.41	rs=-0.39
MID MUSCLE ARM CIRCUMFERENCE (MMAC)	rs=0.24	rs=0.31	rs=-0.29
ADDUCTOR POLICES MUSCLE (APM)	rs=0.37	rs=0.31	rs=-0.27
HAND GRIP STRENGTH (HGS)	rs=0.43	rs=0.28	rs=-0.25
CALF CIRCUMFERENCE (CC)	rs=0.34	rs=0.36	rs=-0.28
SUBJECTIVE GLOBAL ASSESSMENT (SGA)	rs=-0.56	rs=-0.65	rs=0.67
MINI NUTRITIONAL ASSESSMENT (MNA) SCORE	rs=0.6	rs=0.69	rs=-0.77

** p =0.0001 (significant)

This table showed the predictors of QOL of studied HCC patients. BMI, APM thickness, CC, HGS, MNA score, age, and gender were significant predictors of GQL.MAC, HGS, SGA, and MNA scores were predictors of GFS. MAC, MMAC, CC, MNA score, and age were predictors of the symptoms scale. Table 3.

Table 3.predictor factors for quality of life of studied patients

VARIABLE	GLOBAL QUALITY OF LIFE (GQL)	GLOBAL FUNCTIONAL STATUS (GFS)	SYMPTOMS SCALE
BODY MASS INDEX (BMI)	-0.24* (-1.8 to -0.04)	-0.12 (-1.2 to 0.3)	-0.03 (-0.69 to 0.52)
MID ARM CIRCUMFERENCE (MAC)	-0.21 (-2.12 to 0.09)	0.32* (0.05 to 2.8)	-0.44* (-2.9 to -0.66)
MID MUSCLE ARM CIRCUMFERENCE (MMAC)	0.14 (-1.9 to 14.04)	-0.2 (-2.6 to 0.22)	0.3* (0.6 to 2.9)
ADDUCTOR POLICES MUSCLE (APM)	0.21* (0.3 to 1.2)	-0.04 (-0.53 to 0.29)	0.01 (-0.3 to 0.4)
CALF CIRCUMFERENCE (CC)	0.3* (0.5 to 2.3)	0.02 (-0.7 to 0.8)	0.22* (0.22 to 1.5)
HAND GRIP STRENGTH (HGS)	0.3* (0.25 to 0.63)	0.2* (0.12 to 0.47)	-0.01 (-0.15 to 0.12)
SUBJECTIVE GLOBAL ASSESSMENT (SGA)	0.04 (-4.06 to 7.2)	-0.38* (-14.12 to -4.06)	0.2 (-0.6 to 7.5)
MINI NUTRITIONAL ASSESSMENT (MNA) SCORE	0.5* (1.5 to 2.9)	0.27* (0.26 to 1.9)	-0.6* (-2.8 to -1.5)
CHILD CLASSIFICATION	-0.02 (-7.1 to 4.3)	-0.03 (-6.8 to 3.6)	0.001 (-4.14 to 4.25)
BCLC STAGING	0.03 (-1.3 to 2.5)	-.08 (-3 to 0.4)	0.08 (-0.15 to 2.6)
AGE	0.2* (0.2 to 0.6)	0.04 (-0.12 to 0.28)	-0.2* (-0.45 to -0.13)
GENDER	0.2* (3.1 to 14.6)	0.05 (-2.9 to 7.5)	0.07 (-1.5 to 7.04)

SGA (A) as the control group & Child (A) as the control group & BCLC staging (0, A) as the control group &Female as the control group for gender

* Significant (P value <0.05).

4. Discussion

Our study was designed to explore the relationship between the nutritional status of HCC patients and their quality of life, as oncology patients' nutritional condition has a major effect on well-being and quality of life. In cancer patients, QOL assessment provides data about how nutritional support and malnutrition affect this population. Few studies evaluated the association between quality of life and nutritional condition of HCC patients.

Our study's main findings were:

The average of Global Quality of Life (GQL) was (49.91±17.74), the average of Global Functional Status (GFS) was (69.22±16.41), and the average of the symptoms scale was (26.52±15.02). These results were in agreement with [13], who studied QOL of HCC Taiwanese patients and reported that the mean of GQL and GFS was (52.9±20.5) & (76.8±15.9), respectively. Also, in 14 patients, the global quality of life was poor (47.6 ± 28.6).[14] In another Korean study conducted on cancer patients, including HCC patients, GQL was

(48.6 ± 20.2), GFS was (62.5), and the symptoms scale was (32.5).[15] While in a study estimating quality of life of HCC patients in Hong Kong, GQL was (52.22±26.34), GFS was (72.56), and the symptoms scale was (30.6). [16]

The highest functional scales were cognitive functioning (89.91 ± 16.36) and physical functioning (70.1 ± 19.66), while social functioning had the lowest score (50.66 ± 22.28). Among the symptoms, financial difficulties, appetite loss, fatigue, and Insomnia were the most highly scored, but nausea, vomiting, constipation, and diarrhea were the lowest scores. This is in agreement with a study conducted on 130 cirrhotic patients with HCC in the United States.[14] Also in the [16] study, cognitive functioning (76.80 ± 24.68), role functioning (74.61 ± 32.60), and physical functioning (72.27 ± 23.74) were the highest functional scales, but social functioning (68.46 ± 30.33) had the lowest functioning scale. While financial difficulties (51.20 ± 37.22), fatigue (42.93 ± 30.23), and Insomnia (41.88 ± 36.41) had the highest symptom scale, constipation (16.67 ± 27.13), diarrhea (16.45 ± 26.87), and nausea and vomiting (11.26 ± 21.41) had the lowest score. In a study conducted in Egypt to evaluate the QOL of 50 HCC patients who were undergoing radiofrequency ablation at the Interventional Radiology Unit, Ain Shams University Hospital, the treatment cost and its financial burden were the most significant factors associated with low social and family dimensions of QOL.[17]

A highly statistically significant correlation was found between the domains of EORTC QLQ-C30 and different nutritional assessment methods (p = 0.0001), which supports the strong relation between QOL and the nutritional condition of studied patients, and improvements in patients' QOL could be a result of improvements in nutritional status. This agrees with the results of studies conducted on cancer patients that revealed significant correlations between QOL and changes in nutritional status.[18,19] Previous studies assessed how the nutritional support of cancer patients had an impact on QOL; one study revealed that nutritional support positively impacts QOL aspects of cancer patients.[20] In addition, another study found how dietary supplementation could impact QOL and how improving the nutritional status could impact QOL).[21] Another meta-analysis study revealed that correcting nutritional status significantly impacts cancer patients' QOL. [22]

The regression model predicted that BMI, APM, CC, HGS, MNA score, age, and gender were significant predictors of GQL. MAC, HGS, SGA, and MNA scores were significant predictors of GFS. However, MAC, MMAC, CC, MNA score, and age were significant predictors of the symptoms scale. Neither child classification nor cancer stage was a predictor of any domain of QOL. These results could mean that nutritional status played a more significant role in determining QOL in this population than child classification and Barcelona Clinic Liver Cancer (BCLC) stage. However, in [13], self-rated health status and MNA significantly predict QOL.

4. Conclusion

There was a highly statistically significant correlation between domains of EORTC QLQ-C30 and different nutritional assessment methods. This favors the strong relation between QOL and the nutritional status of the studied patients. The state of nutrition played a more significant role in determining QOL in this population than child classification and Barcelona Clinic Liver Cancer (BCLC) stage.

We recommend that a nutritional assessment be combined with a QOL assessment. We also recommend that any HCC treatment plan incorporate nutritional care since it may have a clinically meaningful effect on quality of life.

Disclosure

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Authorship

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