ORIGINAL ARTICLE

Assessment of Nutritional Status in Patients with Cancer and Effectiveness of Oral Nutritional Supplements

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ABSTRACT

Aims and Objectives; Malnutrition is prevalent among individuals with cancer and oral nutritional supplements can improve this issue. The aim of this study was to assess the nutritional status in patients with cancer and effectiveness of oral nutritional supplements.

Material and Method; The present cross-sectional study was conducted in Multan Medical & Dental College, Multan form June 2023 to Sep 2023 after taking permission from the ethical board of the institute."A total of 80 indivuals of different age groups (over 18 years) and both genders diagnosed with cancer who could take an oral diet and were receiving cancer therapy were included. Anthropometric measurements taken were physique, height, body mass index, weight for age (WFA), mid-upper-arm circumference, and triceps skinfold thickness (TSFT). Participants with malnutrition taken oral nutrition supplement from a registered dietitian. They were randomly assigned to receive protein- and energy-dense isocaloric or hypercaloric oral supplements and Resource junior. Individuals were followed up for 6 months, with nutritional valuations performed at the 3rd and 6th months. The nutritional status of the individuals was compared to anthropometric or biochemical parameters using parametric (T test, analysis of variance). The data was analyzed via SPSS 19. P-values ≤ 0.05 were considered statistically significant.""

Results: Overall 80 individuals with cancer were enrolled in this study. The mean age of the study participants was 29.1 ± 7.9 years."Preliminary anthropometric examinations demonstrated decreased incidences of malnutrition determined by weight or height in comparison to body mass index, weight for height, and arm anthropometry. Malnutrition was identified in 27 (33.7%) of those who met at least one of the following criteria: BMI below 5p, weight for height below 90 percent, triceps skinfold thickness or mid-upper-arm circumference lower than 5p, or over five percent weight loss prior to illness start. Participants with mid-upper-arm circumference & triceps skinfold thickness <5p showed no substantial reduction at evaluation or after 3 months. WFA went up significantly between the 1st, 3rd, and 6th months (P < 0.001). Significant rises were seen between the first & 6th months in weight for height, BMI, triceps skinfold thickness, & mid-upper-arm circumference. At the 3rd & 6th months, there was no significant difference in body mass index, weight for height, mid-upper-arm circumference, or triceps skinfold thickness among participants receiving isocaloric or hypercaloric supplements. There was a significant variation in mean blood pre-albumin levels between the first, third, and sixth months (P=0.05)."

Conclusion: The current study concluded that malnutrion is very common in cancer patients and oral nutritional supplements can minimize the nutritional risk in these individuals

Keywords: Assessment; Nutritional status; Cancer; Effectiveness

INTRODUCTION

Malnutrition is a significant issue in patients with cancer.[1] It is associated with poorer physical performance, lower immunological status, greater degree of toxicities, treatment interruption, reduced radiation therapy response rates, readmission to the hospital, decreased quality of life and higher mortality.[2] Although the worldwide recommendations advocate early nutritional assistance in the case of nutritional risk.[3] The most common symptom of malnutrin in cancer patient is weight loss as a result of oncologic pathology and treatment regimens such as chemotherapy and radiation therapy.[4] Cancer-related weight loss and malnutrition can also be caused by a lack of calories and infection. Fat mass loss results from a low calorie intake, whereas muscle mass loss is caused by infection. Cachexia, possibly induced by protein shortage, is also a risk factor in such individuals.[5] These features influence tolerance to treatment methods like as chemotherapy and radiation, resulting in higher treatment dropout rates.[6] Along with conventional metrics such as ideal body weight (IBW) & weight-for-height (WFH), body mass index, a metric based on weight and height, is a frequent predictor of nutritional health. Negative BMI Z values indicate malnutrition, whereas positive ones represent overnutrition.[7] The World Health Organization recognizes Body mass index as a useful and cost-effective method for evaluating nutritional status.[8] Both under- & over-nutrition can contribute to poor clinical results, including greater rates of

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recurrence and mortality in individuals with cancer.[9] Some cancer survivors, notably those with brain tumors, may suffer weight gain as a result of cancer therapy.[10] the current study was carried out to evaluate the nutritional status in patients with cancer and effectiveness of oral nutritional supplements.

MATERIAL AND METHOD

The present randomized clinical. study was conducted in Multan Medical & Dental College, Multan form June 2023 to Sep 2023 after taking permission from the ethical board of the institute. A total of 80 individuals of different age groups (over 18 years) and both genders diagnosed with cancer who could take an oral diet and were receiving cancer therapy were included while individuals who were unable to take diet orally and had concurrent illnesses were excluded. Each participant provided socio-demographic, and anthropometric measures and biochemical profile tests. "Anthropometric measurements taken were physique, height, body mass index, weight for age (WFA), WFH, mid-upper-arm circumference (MUAC), and triceps skinfold thickness (TSFT). Malnutrition was defined as having at least one of the following characteristics: BMI < 5th percentile (p), ideal body weight (WFH) < 90%, TSFT or MUAC < 5p, or >5% weight loss before disease start. Participants with malnutrition taken oral nutrition supplement from a registered dietitian. They were randomly assigned to receive protein- and energy-dense isocaloric or hypercaloric oral supplements and Resource junior. Each patient got an oral supplement with at least forty percent of their suggested daily energy allowance for WFH. The nutritionist assessed whether the supplement was taken frequently. Individuals were followed up for

6 months, with nutritional valuations performed at the 3rd and 6th months. Participants' serum samples were tested for plasma albumin, protein, and pre-albumin at the time of diagnosis, and again at the 3rd and 6th months. Chi-square test was used for the categorical variables, Kolmogorov-Smirnov test was used to ensure that all variables were normal. The nutritional status of the individuals was compared to anthropometric or biochemical parameters using parametric (T test, analysis of variance) & nonparametric (Mann-Whitney and Fisher's exact tests) tests, with the assumption of normal distribution. Assessment of variance was performed for calculating the occurrence of malnutrition among people from the first, third, and sixth months.. Between the first and sixth months, anthropometric and biochemical variables were compared using the Wilcoxon rank-sum test or the 2-sample t-test, with normal distribution assumed. The data was analyzed via SPSS 19. P-values <.05 were considered statistically significant."

RESULTS

Over all 80 individuals with cancer were enrolled in this study out of which 60(75%) were male and 20(25%) were female. the mean age of the study participants was 29.1±7.9 years. Out of the 80 individuals 20 (25%) had Paranasal and nasal cavity cancer 20 (25%) had Oral cavity and 10 (12.5%) had Tongue cancer respectively. Majority of the participants were belonged to urban areas 60 (75%). Approximately 60% of the participants had stage I and II disease. The main feature of the study participants are shown in table 1.

Preliminary anthropometric examinations demonstrated decreased incidences of malnutrition determined by weight or height in comparison to body mass index, weight for height, and arm anthropometry. Among the 80 individuals, 10 (12.5%) had a weight or height of less than 2 SD, whereas 17 (21.2%) had a body mass index, 30 (37.5%) had mid-upper-arm circumference, and 15 (18.5%) had triceps skinfold thickness less than 5p. Malnutrition was identified in 27 (33.7%) of those who met at least one of the following criteria: BMI below 5p, weight for height below 90 percent, triceps skinfold thickness or mid-upper-arm circumference lower than 5p, or over five percent weight loss prior to illness start. Malnutrition prevalence did not differ significantly among individuals according on gender, major disease, stage, or place of residence. Malnutrition was found in 35% of individuals with brain tumors, yet there was not a substantial distinction in malnutrition among those who had or did not have the tumor at diagnosis. Participants with mid-upper-arm circumference & triceps skinfold thickness <5p showed no substantial reduction at evaluation or after 3 months as shown in table 2. Malnutrition percentage declined from 50% to 20% in the second three months after diagnosis, with statistical significance (P=.006). The proportion of individuals with WFH less than 90p and BMI less than 5p declined considerably (P=.003 & P=.04, respectively). WFA went up

significantly between the Ist, 3rd, and 6th months (P <.001). Significant rises were seen between the first & 6th months in weight for height, BMI, triceps skinfold thickness, & mid-upper-arm circumference (P=.003, P=.003, P=.007, & P<.001, respectively) as shown in table 3. At the 3rd & 6th months, there was no significant difference in body mass index, weight for height, mid-upper-arm circumference, or triceps skinfold thickness among participants receiving isocaloric or hypercaloric supplements. There was no significant variation in serum albumin, protein, and pre- albumin levels by sex, stage of disease, or location of residency. In addition, there was no significant relationship between serum pre-albumin as well as albumin levels in individuals who were malnourished or not at the time of valuation. There was a significant variation in mean blood pre-albumin levels between the first, third, and sixth months (P=005). Serum albumin levels increased significantly from the first to 3rd and 6th months (P <.001). At the third month, malnourished individuals had significantly lower pre-albumin levels compared to non-malnourished patients (mean = 0.19 g/L vs. 0.14 g/L; P=.04). Malnourished patients had significantly lower blood albumin levels at 6 months compared to non-malnourished patients (mean=4.5 g/dL vs. 4 g/dL; P=.02). Serum total protein levels did not vary between the first, 3rd, and 6th month's as presented in Table 4.

Table 1: Demographic features of the study participants n= 80

Characteristic n(%)	Frequency /percentage
Age	(year, mean±SD) 29.1±7.9
Gender	
Male	60(75%)
Female	20 (25%)
Cancer location	
Paranasal and nasal cavity	20 (25%)
Oral cavity	20(25%)
Tongue	10 (12.5%)
Salivary gland	10(12.5%)
Lungs	5(6.25%)
Adrenal gland	5 (6.25%)
Osteosarcoma	5 (6.25%)
Nasopharynx cancer	3 (3.75%)
Brain tumor	2 (2.5)
Hepatoblastoma	0 (0)
Langerhans cell histiocytosis	1 (1.25)
Stage	
I–II	60 (75%)
III–IV	20(25%)
Place of residence	
Rural	20(25%)
Urban	60 (75%)
Therapy	
Chemotherapy	72 (90)
Chemotherapy and surgery	4 (5%)
Chemotherapy and radiotherapy	4 (5%

Table 2: Nutritional status of individuals upon screening and Comparison With 3rd and 6th Months^c

Variables	Month zero n (%)	3 months n(%)	6 months n(%)	P
Weight<−2 SD	10(12.5)	11(13.5)	11(13.5)	<.001
Height<−2 SD	4(8)	6(7.5)	6(7.5)	<.001
Body mass index <5p	17(21.2%)	20(25)	10(12.5)	.003
weight for age below 90 percent	30(37.5)	25(31.2)	32(40)	<.001
weight for height below 90 percent	21(42)	11(22)	8(16)	.015
mid-upper-arm circumference<5p	30(37.5)	19(38)	22(44)	<.001
triceps skinfold thickness<5p	15(18.5)	13(16.2)	14(17.5)	.003

C= The variations in prevalence of individuals with malnutrition from the first to the third to the sixth months were estimated using analysis of variance.

Table 3: variation in Mean Z Scores of Anthropometric Parameters From zero to 3rd and 6th month After

Assessment				
Variables	Month zero (95% CI)	Month 3rd (95% CI)	Month 6th (95% CI)	P
Weight ^{x}	−0.74(−4.2,1.9)	−0.7(−4.3,2)	−0.71(−5.5,1.8)	<.001
Height ^{x}	0.51(−4.4,2.3)	−0.46(−3.2,2.2)	−0.75(−3.5,1.3)	<.001
Body mass inde^x	−0.92(−5.5,2.25)	−0.77(−4.6,1.6)	−0.43(−6.5,3.05)	.003
weight for age ^{z}	89.3(51,144)	89.6(50,144)	90.1(41,145)	<.001
weight for height ^{x}	94.5(64,139)	96.2(67,134)	99.4(56,127)	.03
mid-upper-arm circumference ^{x}	−1.15(−5,1.05	−0.7(−3,1.9)	−0.76(−6.6,1.1)	<.001
triceps skinfold thickness ^{x}	−0.41(−1.9,1.2)	−0.35(−1.8,1.9)	−0.14(−3.6,2.7)	.006

X= The variations of anthropometric factors between zero and 6 months were calculated Applying Wilcoxon rank-sum test
z= The differences of anthropometric factors between zero and 6 months were calculated using 2-sample T test

Table 4: Lab identification of the Participants at zero , 3rd, and 6th Months [D]

Biochemical variables (reference values)	Zero month	Month 3rd	Month 6th	P
Prealbumin (0.2–0.4 g/L)	0.19±0.07 0.0	0.18±0.05	0.19±0.06	.005
Albumin (2.4–4.8 g/dL)	5.09±0.7	5.3±0.3	5.4±0.5	<.001
Protein (6.6–8.6 g/dL	6.6±0.96	6.8±0.7	7.0±0.6	>.0

D =The alterations of biochemical factors between zero and 3rd and between zero and 6th
Months were calculated through 2-sample t test.

DISCUSSION

Malnutrition is prevalent among individuals with cancer, accounting for 50-90%.[11] It negatively impacts treatment effectiveness, health, standard of life, and survival.[12] The frequency of this condition varies by cancer type, location, and stage, with gastrointestinal and lung cancers having the greatest rates.[13]Factors such as decreased food intake and chemotherapy-related side effects might contribute to this condition.[14]Malnourished patients have worse tolerance for antineoplastic therapy, leading to higher dose-limiting toxicity and therapy interruptions, resulting in greater rates and longer hospitalizations.[12] In this study we evaluated the nutritional status in patients with cancer and effectiveness of oral nutritional supplements. . A total 80 individuals with cancer were studied. The frequency of malnutrition was observed in 27 (33.7%) of the participants who met at least one of the following criteria: BMI below 5p, weight for height below 90 percent, triceps skinfold thickness or mid-upper-arm circumference lower than 5p, or over five percent weight loss prior to illness start. Malnutrition prevalence did not differ significantly among individuals according on gender, major disease, stage, or place of residence. Our study findings are not similar to the study conducted by Susetyowati,[15] they reported 33.3% prevalence of malnutrition in the cancer patients. While some reported 40% malnutrition in cancer individuals. [16] Nutrition is essential for the body's physiological, biochemical, and immunological processes, as well as growth, development, metabolism, and repair. People with cancer are more likely to experience malnutrition due to disease-related metabolic abnormalities and medication adverse effects. Cancer patients receiving chemotherapy require dietary support to maintain weight and improve their prognosis due to the increased risk of malnutrition.[17] In the present study malnutrition was found in 35% of individuals with brain tumors, yet there was not a substantial distinction in malnutrition among those who had or did not have the tumor at diagnosis. Participants with mid-upper-arm circumference & triceps skinfold thickness <5p showed no substantial reduction at evaluation or after 3 months. Our study results are not similar to the research done by Sala et al[4] which reported 50% incidence of malnutrition. . At the third and sixth months of the current study, there was no significant change in body mass index, weight for height, mid-upper-arm circumference, or triceps skinfold thickness between subjects receiving isocaloric or hypercaloric supplements. Our study findings are similar to Bayram et al.[18] Participants in the current study exhibited blood pre-albumin levels that were lower than normal at the zero, third, and sixth months. Serum albumin, protein, & prealbumin levels did not differ significantly by gender, major disease stage, or residence site at the time of examination.

CONCLUSION

The current study concluded that malnutrion is very common in cancer patients and oral nutritional supplements can minimize the nutritional risk in these individuals.

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