Current Science International
Volume: 13 | Issue: 03| July – Sept.| 2024

EISSN:2706-7920 ISSN: 2077-4435
DOI: 10.36632/csi/2024.13.3.25
Journal homepage: www.curresweb.com
Pages: 305-315

Impact of Probiotic on Quality of Life and Cell Integrity for Patient with Head and Neck Cancer (Single Institution Study)

Ahlam N. Abdel- Azeez[1], Thanaa A. El-Kholy[1], Eman A. Tawfeek[2] and Asmaa Antar ElSayed Faramawy[1]

[1]Nutrition and Food Science Dept., Faculty of Home Economics. AL- Azhar University, Egypt.
[2]Clinical of Oncology and Nuclear Medicine, Faculty of Medicine, Menofia University, Egypt.

Received: 10 April 2024 **Accepted:** 09 May 2024 **Published:** 15 July 2024

ABSTRACT

Background: All over the world, increasing interest was directed to head and neck cancer as one of the most prevalent diseases. Nutrition plays a pivotal role in the management and control of head and neck cancer. **Aim of study:** The effect of taking probiotics on quality of life of head and neck cancer patients. **Patients and Methods:** Sixty-four patients (males and females) between (18-60) years participated, in the study. This experimental controlled study carried out upon patients diagnosed as having head and neck cancer by history, clinical examination and investigations. The patients were randomly divided into two groups: Group (A) which takes probiotics with a diet that is compatible with each case, and Group (B) which is exposed to radiotherapy or chemotherapy and receive the healthy dietary management, but without probiotic. The patients interviewed by the researcher individually and each interview took about 45-60 minutes for Socioeconomic status and weight, body mass index, extent of cell improvement, muscle strength, fat percentage were measured and quality of life (QOL) in feeling pain in groups before and after the nutritional intervention. **Results:** Results shows that the sociodemographic characteristics of studied between the group with probiotic and the group without probiotic, it is clear that there were significant differences between the patients in terms of occupation, ($p = 0.011$). There were (37.5%) & (46.9%) of the patients do not work from probiotic group and without probiotic group respectively. For group without probiotic the change in the weight was (74.4 ± 13.40) before & (68.5 ± 13.41) after with highly significant decrees at ($p =<0.001$); However, for group with probiotic was (70.9 ± 20.37) before & (69.6 ± 18.75) after with no significant difference. Biochemical analysis (Hb, RBCs & HCT) between the groups after intervention showed that there were statistically significant differences between patients with probiotics and patients without probiotics where ($p=0.014$, 0.023& 0.001) respectively. Also, there were significant differences in hemoglobin (Hb)& (RBCs) between patients with probiotic before and after nutrition intervention while Mean ± SD was (10.9 ± 1.25 & 4.3± 0.40) (11.2 ± 1.06 & 4.6 ± 0.47) before and after nutrition intervention respectively. The cell integrity showed statistically significant differences between groups, regarding to fat mass; ECW and phase angle while (p value 0.004 ;0.054 &0.021) respectively. There were highly significant differences in probiotic groups regarding to phase angle before and after intervention, while ($p<0.001$). Also, there were statistically significant differences for quality of life regarding to problems in active, long walking, little walking, stay in bed and stay in chair; as for the group with probiotics , it was found that (37.5%, 43.8%, 40.6%, 56.3%, and 62.5%) respectively do not feel these problems not at all, but in the group without probiotics, these percentages are greatly reduced compared to the probiotic group, it was found that (21.9%, 18.8%, 15.6%, 46.9%, and 25%) respectively do not feel these problems not at all.

Keywords: Probiotics; head and neck cancer, cell integrity, quality of life.

Corresponding Author: Ahlam N. Abdel- Azeez, Nutrition and Food Science Dept., Faculty of Home Economics. AL- Azhar University, Egypt.

1. Introduction

Head and neck cancer (HNC) are malignant, genetically complex and difficult to treat (Mirza *et al*., 2022). Over half of HNC patients experience locoregional recurrence or distal metastasis despite the current multiple traditional therapeutic strategies and immunotherapy (Siegel *et al*., 2023).

Most head and neck cancers are squamous cell carcinomas (HNSCC) (Hardman *et al*., 2021). According to Global Cancer Statistics (GLOBCAN), HNSCC was the sixth most common type of cancer worldwide (Bray *et al*., 2019; Ferlay *et al*., 2020).

Patients with head and neck cancer are at risk of malnutrition as a result of the site of their cancer, the disease process and the treatment. Patients may have long standing dietary habits and detrimental lifestyle factors that may predispose them to malnutrition (Paccagnella *et al*., 2021).

Probiotics are microorganisms which, when administered sufficient quantities, confer a beneficial action on the health of the patient" (Anderson *et al*., 2023).

Lactobacillus and Bifidobacterium are two of the most common probiotic bacteria found in lactic acid bacteria (LAB), and studies have demonstrated that both strains can mediate anticancer responses (Caccialanza *et al*., 2021).

These bacteriocins are considered to be "natural preservatives". Probiotics have also been associated with nutrients to compete with pathogens, thereby inhibit / block pathogenic bacterial adhesion in the colonic lumen, and thereby improve mucus production, which in turn enhances the intestinal epithelial barrier for stimulation of the immune system (Romaguera *et al*., 2021; Zhang *et al*., 2020; Cheng *et al*., 2020).

2-Patients and Methods

Sixty-four patients (males and females) between (18-60) years participated, in the study according to (Open Epi-info software, Version 3). We used the experimental, prospective controlled study survey to evaluate cell integrity before and after the experiment. This experimental, prospective controlled study carried out upon patients diagnosed by specialist Physician (by an oncologist)as having head and neck cancer by history, clinical examination and investigations. patients will receive anticancer treatment (Radiotherapy and/or Chemotherapy) according to stage of head and neck cancer. Patients recruited from" Menofia University Hospital" and "Tanta University Hospital " the Head and neck cancer Clinic of the Oncology department. Before participating in the study, the protocol was fully explained to the patients and their informed consent was obtained. The patients interviewed by the researcher individually. Body composition and phase angle are measured by TANITA(MC-780MA). The standard mean from phase angle (PA) for male is (7.48±1.1) and female is (7.3± 1.01) (Sarhill *et al*., 2012).

3. Results

According to the results of the study of head and neck cancer patients. Socio-demographic, nutritional outcomes, biochemical analysis, cell integrity and quality of life were evaluated as in the following tables:

3.1. Sociodemographic characteristics of the study subjects

Table (1) showed the sociodemographic characteristics of studied between the group with probiotic and the group without probiotic. There were significant differences between the patients in the two groups in terms of occupation, ($p = 0.011$). There were (37.5%) & (46.9%) of the patients do not work from probiotic group and without probiotic group respectively**.**

Table 1: Sociodemographic characteristics of studied between the group with probiotic and the group without probiotic (n=64).

	With probiotic (n=32)		Without probiotic (n=32)		Test of sig.	P
	No.	%	No.	%		
Age (year)						
Mean ± SD.	59.3 ± 12.45		59.1 ± 13.75		**T 0.067**	**0.947**
Min. – Max.	21.0 – 81.0		31.0 – 85.0			
Sex						
Male	23	71.9	22	68.8	**χ^2 0.075**	**0.784**
Female	9	28.1	10	31.3		
Educational level						
Illiterate	13	40.6	10	31.3		
Read-write	4	12.5	6	18.8		
Primary	4	12.5	2	6.3		
Preparatory	2	6.3	4	12.5	**MC**	**0.603**
Secondary	4	12.5	2	6.3		
Institute (2 years)	0	0.0	2	6.3		
University	5	15.6	6	18.8		
Occupation						
Not working	12	37.5	15	46.9		
Skilled manual worker	7	21.9	6	18.8	**MC**	**0.011***
Trades/business	8	25.0	0	0.0		
Semi-professional	5	15.6	11	34.4		
Marital status						
Married	14	43.8	15	46.9		
Unmarried	5	15.6	2	6.3	**MC**	**0.592**
Divorced or widow	13	40.6	15	46.9		
Socioeconomic status						
Very low			1	3.1		
Low	12	37.5	7	21.9	**MC**	**0.242**
Middle	10	31.3	16	50.0		
High	10	31.3	8	25.0		

MC: Monte Carlo Exact test ***p ≤ 0.05** (Statistically significant)

3.2. Anthropometric measures and health status of the study participants.

Table (2) Illustrate that anthropometric measurements between the groups. There were significant differences between weight before and after nutrition intervention; in the probiotic group the decrease in body weight was small compared to the group of without probiotic. For group without probiotic the mean ± SD was (74.4 ± 13.40) before & (68.5 ± 13.41) after with high significant decrees at (p =<0.001); However, for group who took probiotic mean ± SD was (70.9 ± 20.37) & (69.6 ± 18.75) before & after nutrition intervention respectively without any significant difference.

Table 2: Anthropometric measurements between the group with probiotic and the group without probiotic before and after the nutritional intervention (n=64).

	With probiotic (n=32)		Without probiotic (n=32)		Test of sig.	P
Height (cm) before						
Mean ± SD.	160.5 ± 24.09		167.0 ± 8.48		**T 1.441**	**0.155**
Min. – Max.	39.8 – 182.0		150.0 – 180.0			
Height (cm)after						
Mean ± SD.	160.5 ± 26.04		166.9 ± 8.39		**T 1.344**	**0.184**
Min. – Max.	27.0 – 182.0		150.0 – 180.0			
Paired t test	**0.011**		**0.329**			
P	**0.992**		**0.745**			
Weight (kg) before						
Mean ± SD	70.9 ± 20.37		74.4 ± 13.40		**T 0.804**	**0.425**
Min. – Max.	16.4 – 110.0		39.4 – 97.8			
Weight (kg)after						
Mean ± SD.	69.6 ± 18.75		68.5 ± 13.41		**T 0.268**	**0.789**
Min. – Max.	12.8 – 102.0		35.6 – 96.6			
Paired t test	**0.759**		**6.774**			
P	**0.453**		**<0.001***			
BMI (kg/m^2) before						
Mean ± SD.	26.3 ± 6.19		25.9 ± 3.91		**t 0.282**	**0.779**
Min. – Max.	12.5 – 41.8		17.2 – 31.6			
BMI (kg/m^2) after						
Mean ± SD.	25.9 ± 5.35		24.4 ± 3.95		**t 1.348**	**0.183**
Min. – Max.	15.5 – 40.0		15.3 – 33.0			
Paired t test	**0.690**		**4.230**			
P	**0.495**		**<0.001***			
Mid arm circumference(cm)						
Severe malnutrition <12.5	4	12.5	3	9.4	**MC**	**0.640**
Mild malnutrition 12.5 - 13.5	22	68.8	19	59.4		
Good nutrition >13.5	6	18.8	10	31.3		

MC: Monte Carlo Exact test ***p ≤ 0.05** (Statistically significant).

3.3. Biochemical analysis

Table (3) showed that biochemical analysis (Hb, RBCs, HCT&MCH) between the groups, there were statistically significant differences between patients with probiotics and patients without probiotics where (p=0.042, 0.023, 0.001, 0.049) respectively.

Also, there were statistically high significant differences between patients with probiotics before and after nutrition intervention regarding to (RBCs) while (p=0.003) and Mean ± SD before was (4.3± 0.40) and after was (4.6 ± 0.47) respectively.

There were significant differences in (MCV)& (MCH**)** between patients with probiotic group before and after nutrition intervention while Mean ± SD was (78.1 ± 13.67), (24 ± 2.14) and (84.6 ± 3.95), (25.2 ± 1.97) with significant deference's at p (0.11 &0.001) respectively. There was an improvement in Mean ± SD of hemoglobin, MCV and MCH in the group with probiotic (11.2, 84.6 & 25.2) and the group without probiotic (10.7, 82.6 & 25.1) respectively after the nutritional intervention.

Table 3: Biochemical analysis (Hb, RBCs, HCT, MCV &MCH) between the group with probiotic and the group without probiotic before and after the nutritional intervention (n=64).

	With probiotic (n=32)	Without probiotic (n=32)	Test of sig.	P
Hb before				
Mean ± SD.	10.9 ± 1.25	10.2 ± 1.17	**T**	
Min. – Max.	8.5 – 13.0	8.5 – 13.0	**2.533**	**0.014***
Hb after				
Mean ± SD.	11.2 ± 1.06	10.7 ± 1.06	**T**	
Min. – Max.	9.3 – 13.0	8.9 – 13.0	**2.057**	**0.042***
Paired t test	**4.229**	**7.665**		
P	**<0.001***	**<0.001***		
RBCs before				
Mean ± SD.	4.3 ± 0.40	4.3 ± 0.33	**T**	
Min. – Max.	3.4 – 5.0	3.9 – 5.0	**0.137**	**0.891**
RBCs after				
Mean ± SD.	4.6 ± 0.47	4.3 ± 0.37	**T**	
Min. – Max.	3.06 – 5.6	3.09 – 5.0	**2.335**	**0.023***
Paired t test	**3.283**	**0.563**		
P	**0.003***	**0.577**		
HCT before				
Mean ± SD.	37.7 ± 5.11	42.2 ± 2.78	**T**	
Min. – Max.	30.0 – 49.5	35.0 – 46.2	**4.366**	**<0.001***
HCT after				
Mean ± SD.	37.7 ± 3.44	41.9 ± 3.03	**T**	
Min. – Max.	32.0 – 45.1	33.5 – 46.2	**5.282**	**<0.001***
Paired t test	**0.165**	**1.068**		
P	**0.870**	**0.294**		
MCV before				
Mean ± SD.	78.1 ± 13.67	81.9 ± 6.31	**T**	
Min. – Max.	8.4 – 90.5	72.5 – 95.0	**1.431**	**0.157**
MCV after				
Mean ± SD.	84.6 ± 3.95	82.6 ± 5.55	**T**	
Min. – Max.	71.0 – 90.5	72.5 – 95.0	**1.700**	**0.095**
Paired t test	**2.694**	**2.263**		
P	**0.011***	**0.031***		
MCH before				
Mean ± SD.	24.0 ± 2.14	24.9 ± 2.70	**T**	
Min. – Max.	20.5 – 29.3	20.0 – 29.5	**2.006**	**0.049***
MCH after				
Mean ± SD.	25.2 ± 1.97	25.1 ± 2.44	**T**	
Min. – Max.	21.1 – 29.3	21.6 – 29.5	**1.887**	**0.064**
Paired t test	**5.163**	**2.350**		
P	**<0.001***	**0.025***		

t: Independent t test paired t test ***p ≤ 0.05** (Statistically significant) **Hb/** Hemoglobin **RBCs** / Red Blood Cells **HCT** / Hematocrit **MCV/** Mean Corpuscular Volume **MCH** / Mean Corpuscular Hemoglobin.

3.4. Quality of Life (QOL) between the group

Table (4) showed that there were significant differences for quality of life in patient regarding to problems in active, long walking, little walking, stay in bed and stay in chair; as for the group with probiotics , it was found that (37.5%, 43.8%, 40.6%, 56.3%, and 62.5%) respectively do not feel these problems not at all, but in the group without probiotics, these percentages are greatly reduced compared to the probiotic group, it was found that (21.9%, 18.8%, 15.6%, 46.9%, and 25%) respectively do not feel these problems not at all.

Table 4: Quality of Life (QOL) between the group with probiotic and the group without probiotic before and after the nutritional intervention (n=64).

	With probiotic (n=32)		**Without probiotic (n=32)**		**χ^2**	**p**
	No.	**%**	**No.**	**%**		
Problem in activity						
Not at all	12	37.5%	7	21.9%	**10.123**	**0.018***
A little	9	28.1%	2	6.3%		
Quite bit	6	18.8%	11	34.4%		
Very much	5	15.6%	12	37.5%		
Problem in long walking						
Not at all	14	43.8%	6	18.8%	**7.329**	**0.062**
A little	7	21.9%	5	15.6%		
Quite bit	7	21.9%	10	31.3%		
Very much	4	12.5%	11	34.4%		
Problem in little walking						
Not at all	13	40.6%	5	15.6%	**8.647**	**0.034***
A little	6	18.8%	7	21.9%		
Quite bit	9	28.1%	7	21.9%		
Very much	4	12.5%	13	40.6%		
Stay in bed						
Not at all	18	56.3%	15	46.9%	**4.587**	**0.205**
A little	7	21.9%	3	9.4%		
Quite bit	3	9.4%	4	12.5%		
Very much	4	12.5%	10	31.3%		
Stay in chair						
Not at all	20	62.5%	8	25.0%	**11.683**	**0.009***
A little	5	15.6%	4	12.5%		
Quite bit	2	6.3%	4	12.5%		
Very much	5	15.6%	16	50.0%		

MC: Monte Carlo Exact test ***p ≤ 0.05** (Statistically significant)

3.5. Cell integrity between the group with probiotic and the group without probiotic before and after nutrition intervention.

According to Table (5) cell integrity showed that there were statistically high significant differences between the groups, regarding to fat mass (p value= 0.004). The Mean ± SD of F mass decreased in the group without probiotic from (18.6 ± 7.46) to (15.8±7.09), but in the group with probiotic the Mean ± SD of F mass not decrease, it was (22.5±10.24) and became (22.3± 10.06). There was an improvement in extra cellular water (ECW) in the probiotic group while Mean ± SD was (17.7 ±5.50) before probiotic and was (18.5± 50.93) after probiotic; but Mean ± SD was decrease in the group without probiotic; it was (17.0 ± 2.77) and became (16.3 ± 2.79). Also, intra cellular water (ICW) was decrease in the group without probiotic but increase in the probiotic group as Mean ± SD was (21.6 ± 4.86) and (20.7 ± 4.91) but (20.3 ± 5.09) and (21.8 ± 6.34) before and after intervention respectively.

Table 5: Cell Integrity between the group with probiotic and the group without probiotic before and after nutrition intervention (n=64).

	With probiotic (n=32)	Without probiotic (n=32)	Test of sig.	P
Fat M before				
Mean ± SD.	22.5 ± 10.24	18.6 ± 7.46	**T 1.755**	**0.084**
Min. – Max.	2.6 – 39.4	5.2 – 33.0		
Fat M after				
Mean ± SD.	22.3 ± 10.06	15.8 ± 7.09	**T 3.009**	**0.004***
Min. – Max.	3.0 – 35.3	2.8 – 30.0		
Paired t test	**0.228**	**3.914**		
P	**0.821**	**<0.001***		
V Fat before				
Mean ± SD.	10.0 ± 4.71	10.6 ± 3.54	**T 0.510**	**0.612**
Min. – Max.	1.0 – 20.0	4.0 – 17.0		
V Fat after				
Mean ± SD.	10.0 ± 4.55	9.2 ± 3.62	**T 0.788**	**0.434***
Min. – Max.	1.0 – 19.0	2.0 – 17.0		
Paired t test	**0.070**	**4.415**		
P	**0.945**	**<0.001***		
ECW before				
Mean ± SD.	17.7 ± 5.50	17.0 ± 2.77	**T 0.614**	**0.541**
Min. – Max.	7.8 – 39.0	9.7 – 22.1		
ECW after				
Mean ± SD.	18.5 ± 50.93	16.3 ± 2.79	**T 1.967**	**0.054***
Min. – Max.	7.9 – 36.9	9.0 – 21.1		
Paired t test	**1.021**	**3.748**		
P	**0.315**	**0.001***		
ICW before				
Mean ± SD.	20.3 ± 5.09	21.6 ± 4.86	**T 1.092**	**0.279**
Min. – Max.	9.7 – 32.2	9.5 – 28.5		
ICW after				
Mean ± SD.	21.8 ± 6.34	20.7 ± 4.91	**T 0.044**	**0.965**
Min. – Max.	9.7 – 42.8	8.5 – 28.5		
Paired t test	**0.475**	**2.394**		
P	**0.638**	**0.023***		
Phase angle (PA) before				
Mean ± SD.	4.9 ± 0.57	5.6 ± 1.11	**T 0.158**	**0.875**
Min. – Max.	3.5 – 5.9	1.4 – 3.4		
Phase angle (PA) after				
Mean ± SD.	5.5 ± 0.58	4.9 ± 1.19	**T 2.401**	**0.021***
Min. – Max.	3.9 – 6.3	2.6 – 7.2		
Paired t test	**7.521**	**5.114**		
P	**<0.001***	**<0.001***		

t: Independent t test paired t test ***p ≤ 0.05** (Statistically significant) **Fat P:** fat percentage **V Fat:** visceral fat **Fat M:** fat mass **ECW**: extra cellular water **ICW:** intra cellular water **Bone M:** bone mass **(PMM):** percentage muscle mass **PA:** Phase angle

There were high significant differences in probiotic group regarding to phase angle at ($p<0.001$) and the mean ± SD was (4.9 ± 1.19) & (5.5 ± 0.58) before and after intervention respectively. Also,

we show significant differences between the group with probiotic and the group without probiotic after intervention while (p=0.021) and Mean ± SD was (5.5 ± 0.58) and (4.9 ± 1.19) respectively. There was change in the mean ± SD for two groups in phase angel, before it was (4.9 ± 1.19) & (5.6 ±1.11) and after intervention become (5.5 ±0.58) & (4.9 ± 1.19) for group with and without probiotic respectively

4. Discussion

Nutritional status and eating habits have an important impact on patients with head and neck cancer. In this study, the complete nutritional profile of a sample of Egyptians was presented head and neck cancer patients were carefully evaluated.

4.1. Sociodemographic characteristics:

The results showed that the prevalence of head and neck cancer among males reached (71.9%), while in females it was (28.1%). This is consistent with Dong *et al.* (2020), they found that squamous cell cancers are 1.2 times more common among males. This may reflect internal biological differences specific to sex or external environmental differences that affect health care.

Sung *et al.* (2021) said that head and neck cancer is the seventh most common type of cancer, and the incidence of oral cancer was 2.8 times higher in males than in females. This is consistent with our results, which showed that the signs and symptoms of the disease were dry mouth which represent of (43.8%).

4.2. Anthropometric measurements

In our study there was also a severe decrease in weight with the progress of treatment and exposure to radiation as (p value =0.425), and the mean ± SD of weight in the group with probiotic before intervention was (70.9 ± 20.37) and after intervention was(69.6 ± 18.75),but in the group without probiotic before intervention was (74.4 ± 13.40) and after intervention was(68.5 ± 13.41) and this agreed with Paccagnella *et al.* (2021), they pointed that during the radiotherapy, (78.7%) of patients experienced weight loss (p<0.001). The risk of weight loss higher in patients with cancer in the larynx and oral cavity. Severe weight loss (≥5% during the radiation course) was observed in 47.8% of patients. There is the highest risk of severe weight loss in patients undergoing chemoradiation therapy with previous surgical resection (83.3%). The incidence of severe weight loss in normal-weight patients compared to overweight patients was significant. Severe weight loss was more common at higher doses and in younger patients.

According to body mass index change during treatment as little change happened in the group with probiotic when compared BMI before and after nutrition intervention, but in the group without probiotic there were high significant differences as (p value<0.001). The mean of BMI decrease from (25.9 ± 3.91) before to(24.4 ± 3.95) after nutrition intervention, this is agreed with Creaney *et al.* (2022) and Miller *et al.* (2021) they said that during treatment, Problems occur which led to reduced food intake and loss of appetite which is a common problem in head and neck cancer patients and has an impact on the patient's survival, as significant weight loss is associated with the risk of death by an amount 1.7 times.

4.3. Biochemical analysis

Our results showed that there were change in hemoglobin and hematocrit levels as a result of exposure to radiotherapy and the appearance of symptoms of lack of appetite and dysphagia and this agreed with Einarsson *et al.* (2021), said that biochemical change occurs in more than 30% of head and neck cancer patients before the initiation of anticancer therapy , while published data from the European Cancer Anemia Survey (ECAS) suggest that, among non-anemic cancer patients at the start of anti-tumor therapy, the incidence of anemia after chemotherapy is 63%, after chemo-radiotherapy 40%, and after radiotherapy 20% . The prevalence seems to increase with age and might differ according to the cancer typology. Hemoglobin can rapidly decline in head and neck cancer patients receiving chemotherapy with hemoglobin levels around 10 g/dL, particularly in patients ≥65 years of age. The rapid rate of hemoglobin decline in these patients should be considered for optimal anemia management.

Also, patients with head and neck cancer are suffer from the percentage of albumin, when treated with radiation and chemotherapy along with a nutritional program, there were a change, but not significant, in the mean of albumin. The mean in the probiotic group was (3.8 ± 0.66) and became (3.4 ± 0.57), and for the without probiotic group it was (3.9 ± 0.54) and became (3.6 ± 0.47). This is consistent with the research of both (Kawakita *et al*., 2022; Louie *et al*., 2022) they said that albumin deficiency is closely related to the survival rate, as at the beginning of the study (12%) of patients had albumin deficiency and (75%) had normal albumin, and it was unknown for (13%). But at the end of the study, it was found that (22%) suffered from albumin deficiency, (48%) had normal albumin, and (30%) were unknown. Therefore, the rate of relapse in albumin levels is high.

4.4. Quality of Life

Our results revealed that were significant differences for quality of life in patient who took probiotics regarding to problems in active and walking, it was found that (37.5% and 43.6%) do not feel problems not at all, but in the group without probiotics, these percentages were greatly reduced compared to the probiotic group, it was found that (21.9% and 18.8%) do not feel these problems not at all. This agreed with Aman and Masood (2020) they found that the probiotics affect of on patients receiving radiation and chemotherapy. This study evaluated the effectiveness of taking probiotics for 4 months in patients with head and neck cancer. This study provided preliminary results on the extent of improvement in functional ability and thus improvement in quality of life compared by other groups.

Also, we find an improvement in the ability of walking among patient taking probiotic, and this is consistent with Haro *et al.* (2020), who said that there is an improvement in the percentage of patients who depend on themselves from (35.3% to 51.2%), and improvement in physical functions by (12.5%) among head and neck cancer patient.

4.5. Cell integrity

Our study showed that there were statistically significant differences between the groups, regarding to fat mass (p value= 0.004). The Mean ± SD of F mass decreased in the group without probiotic from (18.6 ± 7.46) to (15.8±7.09), but in the group with probiotic the Mean ± SD of F mass not decrease, it was (22.5±10.24) and became (22.3± 10.06). This is agreed with Freedman *et al.,* 2020; Fusaro *et al.,* 2022). This study has shown that some probiotic strains (*L. acidophilus*, *L. casei, B. longum*, or *L. rhamnoses* among others) are a valid therapeutic strategy in some common treatment-related side effects in adult oncology patients, using both single or multiple strain combinations for at least 8 weeks of treatment like Sleep Quality Index or depression A significant time effect in the experimental group (p = 0.007& p=0.005) and (mean ± SD, 5.61 ± 2.17 & 4.56 ±2.25) were found. Furthermore, despite its exploratory nature, this study provides some insight into the importance of chemotherapy and radiotherapy, inducing major changes in the composition of microbiota, where these probiotic strains may play an important role to prevent or treat such complications.

Also, we found an improvement in the percent of cellular water (ECW) and intra cellular water (ICW) in the probiotic group, this agreed with Anderson *et al.* (2023) who said that when malnutrition occurs, early membrane permeability increases, body fluid flows from intracellular water (ICW) to extracellular water (ECW), ECW/ICW increases and body cell mass decreases, adversely affecting the electrical properties of tissues.

Also, there were significant differences in groups for phase angle (PA)as (p value =0.021). Before nutrition intervention the mean was (4.9± 0.57)and after nutrition intervention was(5.5± 0.58)in the group with probiotic but in the group without probiotic the mean was(5.6± 1.11)before nutrition intervention and (4.9± 1.19) after nutrition intervention this is agreed with Johnson *et al*. (2020) who said that a systematic review reported the predictive ability of (PA) phase angle for nutritional status in advanced cancer patients and found that low PA was related to worse nutritional status as assessed by BMI, serum albumin level, transferrin, and fat-free mass. And agreed with Kong *et al.* (2023) who said that individuals who incorporated a probiotic supplement into their daily diet for twelve months demonstrated a noteworthy decrease of approximately 15% in cell damage for patients the emerging neck and head cancer, as compared to their counterparts who did not.

5. Conclusion

In conclusion, diet can improve the health status of head and neck cancer patients, and following unhealthy eating habits can increase its clinical manifestations, especially; Neglecting drinking water, and excessive and irregular use of drinks containing caffeine, eating a lot of ready-made meals and preserved foods, fried foods, soft drinks, sweets and free sugars. Also, low education low socioeconomic level, low level of physical activity and obesity have an impact indirect on disease. So, the nutrition management in addition to increasing the daily intake of water and protein and incorporated a probiotic supplement into their daily diet and preventing foods that because recurrence may increase the burden; therefore, this must be taken into consideration while planning the diet Patients and educated them about these topics.

Conflict of Interest

The authors reported no conflict of interest.

References

Anderson, G., M. Ebadi, K. Vo, J. Novak, A. Govindarajan, and A.F. Amini, 2023. A Updated Review on Head and Neck Cancer Treatment with Radiation Therapy. Cancers. 13:4912. doi: 10.3390/cancers13194912

Aman, F. and S. Masood, 2020. How Nutrition Can Help to Fight against COVID-19 Pandemic. Pakistan Journal of Medical Sciences, 36, (COVID19-S4). https://doi.org/10.12669/pjms.36.COVID19-S4.2776

Bray, F., J. Ferlay, I. Soerjomataram, R.L. Siegel, L.A. Torre, and A. Jemal, 2019. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J. Clin. 68: 394–424. doi: 10.3322/caac.21492

Caccialanza, A., K. Spyridopoulou, V. Santarmaki, G. Aindelis, E. Tompoulidou, E. Lampranidou, G. Saxami, P. Ypsilantis, E. Lampri, and C. Simopoulos, 2021. *Lactobacillus casei* exerts anti-proliferative effects accompanied by apoptotic cell death and up-regulation of TRAIL in carcinoma cells. 11, e0147960

Cheng, B., X. Zeng, S. Liu, J. Zou, and Y. Wang, 2020. The efficacy of probiotics in management of recurrent aphthous stomatitis: A systematic review and meta-analysis. Sci. Rep. 10:21181. doi: 10.1038/s41598-020-78281-7.

Creaney, G., A.D. McMahon, A.J. Ross, L.A. Bhatti, C. Paterson, and D.I. Conway, 2022. Head and neck cancer in the UK: What was the stage before COVID-19? UK cancer registries analysis Br. Dent. J. 233:787–793.

Dong, M., G. Cioffi, J. Wang, K.A. Waite, Q.T. Ostrom, C. Kruchko, J.D. Lathia, J.B. Rubin, M.E. Berens, and J. Connor, 2020. Sex Differences in Cancer Incidence and Survival: A Pan-Cancer Analysis. Cancer Epidemiol. Biomark. Prev., 29:1389–1397.

Einarsson, S., H.E. Karlsson, O. Björ, A.K. Haylock, and Y. Tiblom Ehrsson, 2021. Mapping impact factors leading to the GLIM diagnosis of malnutrition in patients with head and neck cancer. Clin. Nutr. ESPEN .40:149–155.

Fusaro, M., L. Cosmai, P. Evenepoel, T.L. Nickolas, A.M. Cheung, A.Aghi, G. Tripepi, M. Plebani, G. Iervasi, and R. Vettor, 2022. Vitamin K and Kidney Transplantation. Nutrients, 12, 2717.

Ferlay, J., M. Ervik, F. Lam, M. Colombet, L. Mery, M. Piñeros, A. Znaor, I. Soerjomataram, and F. Bray, 2020. *Global Cancer Observatory: Cancer Today.* International Agency for Research on Cancer; Lyon, France.

Freedman, S.B., D. Schnadower, and P.I. Tarr, 2020. The probiotic conundrum: regulatory confusion, conflicting ctudies, and safety concerns. 323(9):823–824. doi:10.1001.

Hardman, J.C., T. Tikka, V.E.N.T. Paleri, and U.K. Bahno, 2021. Remote triage incorporating symptom-based risk stratification for suspected head and neck cancer referrals: A prospective population-based study. 127: 4177-4189.

Haro, R., S.B. Cohen, R. Kammer, and J. Ringash, 2020. Evaluation of quality of life and organ function in head and neck squamous cell carcinoma. Hematol Oncol Clin North Am., 22(6):1239–1256. doi: 10.1016/j.hoc. 08.011.

Johnson, D.E., B. Burtness, C.R. Leemans, V.W.Y. Lui, J.E. Bauman, and J.R. Grandis, 2020. Head and neck squamous cell carcinoma. Nat. Rev. Dis. Primers. 6:92. doi: 10.1038/s41572-020-00224-3.

Kawakita, D., I. Oze, S. Iwasaki, T. Matsuda, K. Matsuo, and H. Ito, 2022. Trends in the incidence of head and neck cancer by subsite between 1993 and 2015 in Japan. Cancer Med.11:1553–1560.

Kong, P., J. Gao, Y. Wang, Fang, and C. Hwang, 2023. "Advances of medical nanorobots for future cancer treatments," Journal of Hematology and Oncology, 16(1):74.

Louie, K.S., H. Mehanna, and P. Sasieni, 2021. Trends in head and neck cancers in England from 1995 to 2011 and projections up to 2025. Oral Oncol. 51:341–348.

Miller, K.D., L. Nogueira, A.B. Mariotto, J.H. Rowland, K.R. Yabroff, C.M. Alfano, A. Jemal, J.L. Kramer, and R.L. Siegel, 2021. Cancer treatment and survivorship statistics. *CA Cancer J. Clin.* 69:363–385.

Mirza, M.A., D. Aruna, and M. Irukulla, 2022. Efficacy of *Bacillus clausii* UBBC-07 spores in the amelioration of oral mucositis in head and neck cancer patients undergoing radiation therapy. Cancer Treat. Res. 31:100523. doi: 10.1016/j.ctarc.2022.100523.

Open EPI, 2022. Version 3, open source calculator—SSP report. Available at: https://www.openepi.com/Sample Size/SSCohort.htm Accessed on 22 July.

Paccagnella, A., M. Morello, M.C. Da-Mosto, C. Baruffi, M.L. Marcon, and A. Gava, 2021. Early nutritional intervention improves treatment tolerance and outcomes in head and neck cancer patients undergoing concurrent chemoradiotherapy. 18:837-45.

Romaguera, D., S. Fernandez-Barres, and E.E. Gracia-Lavedan, 2021. Consumption of ultra-processed foods and drinks and colorectal, breast, and prostate cancer. Clin. Nutr., 40(4):1537–1545.

Sarhill, N., D. Walsh, K. Nelson, and M. Davis, 2012. Evaluation and treatment of cancer-related fluid deficits: Volume depletion and dehydration. Support Care Cancer, 9:408-419.

Siegel, R.L., K.D. Miller, N.S. Wagle, and A. Jemal, 2023. Cancer statistics, 2023. CA Cancer J. Clin. 73:17–48. doi: 10.3322/caac.21763.

Sung, H., J. Ferlay, R.L. Siegel, M. Laversanne, I. Soerjomataram, A. Jemal, and F. Bray, 2021. Globocan Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. 71:209–249. doi: 10.3322/caac.21660.

Zhang, J., S. Wittouck, E. Salvetti, C. Franz, H.M.B. Harris, and P. Mattarelli, 2020. A taxonomic note on the genus Lactobacillus: description of 23 novel genera, emended description of the genus Lactobacillus Beijerinck 1901, and union of Lactobacillaceae and Leuconostocaceae. 70(4):2782–2858.