Omega-3 fatty acid-, micronutrient-, and probiotic-enriched nutrition helps body weight stabilization in head and neck cancer cachexia

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Objective. To evaluate whether an oral nutritional supplement enriched with omega-3 fatty acids, micronutrients, and probiotics affected body weight (BW) changes, serum albumin and prealbumin levels in patients with head and neck cancer (HNC) cachexia.

Study Design. Sixty-eight HNC patients were randomly assigned to receive either an Ethanwell/Ethanzyme (EE) regimen enriched with omega-3 fatty acids, micronutrients, and probiotics, or control (Isocal) for a 3-month period. Analysis of covariance was used to examine the association between BW change and variables.

Results. Patients with body mass index (BMI) <19 and those receiving the EE regimen consumed fewer daily calories but showed significantly increased BW and maintained higher serum albumin and prealbumin levels than other patients ($P < .05$). Their BW changes were significantly associated with changes in serum albumin and prealbumin levels.

Conclusions. EE regimen improved BW as well as serum albumin and prealbumin levels in HNC patients with BMI <19. (Oral Surg Oral Med Oral Pathol Oral Radiol 2013;116:41-48)

More than half of the patients with head and neck cancers (HNCs) develop protein-energy malnutrition by the time of diagnosis and before treatment initiation. Liu et al.[1] analyzed 1010 patients with oral cavity cancer and found that patients with a preoperative body mass index (BMI) <22.8 and serum albumin levels <4.15 g/dL generally had lower survival rates. Regardless of the treatment modalities used, individualized and intensive nutrition programs for HNC patients were beneficial in minimizing body weight (BW) loss, decreasing treatment-related toxicity, maintaining overall quality of life, and improving physical function.[2-4] Davidson et al.[5] reported that weight stabilization over an 8-week period in malnourished cancer patients was associated with improved survival and quality of life. However, energy- and protein-dense nutritional supplements alone failed to influence weight loss in advanced cancer patients because of a combination of metabolic changes that prevented the efficient use of the nutrients supplied.[6]

Recent studies using an oral nutritional supplement enriched with omega-3 fatty acids have demonstrated improvements in weight, lean body mass, and serum protein concentrations as well as decreases in post-operative complications and hospital stay times.[7,8] In addition to general malnutrition, there is evidence that micronutrient deficiency is involved in cancer cachexia. For instance, selenium (Se), an essential trace element, can have protective effects against cancer in humans.[9-11] Selenium deficiency induces production of cachexic cytokines, and proper selenium supplementation can reverse the release of these cytokines, consequently inhibiting cachexia progression.[12] Patients suffering from severe physiological stress, such as that associated with cancer- and treatment-related mucositis, often have deficient levels of L-glutamine, a nonessential amino acid.[13] For cancer patients undergoing chemotherapy or bone marrow transplantation, glutamine supplementation can alleviate the severity of mucositis.[14,15] Additionally,

Statement of Clinical Relevance

An oral nutritional supplement enriched with omega-3 fatty acids, micronutrients, and probiotics afforded advantages in body weight changes and serum albumin and prealbumin levels in patients with head and neck cancer cachexia.

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Table I. Major components of the trial Ethanwell/Ethanzyme (EE) nutritional supplement and Isocal

*Ethanwell powder**	*1 Serving: 72 g*	*Isocal*	*237 mL*
Components (units)	*Amount per serving*	*Components (units)*	*1 Can*
Calorie (kcal)	290	Calorie (kcal)	250
Osmolarity (mOsm/kg)	450	Osmolarity (mOsm/kg)	270
Protein (g)	16	Protein (g) (caseinates, 80%)	10.4
Carbohydrates (g)	43	Carbohydrates (g)	29
Diet fiber (g)	6	Diet fiber (g)	NA
Fat (g)	6	Fat (g)	10.7
Omega-3 fatty acids (g)	1.4	Soy oil (%)	60
Monounsaturated fatty acids (g)	2	Medium chain triglycerides (%)	40
Polyunsaturated fatty acids (g)	2	Water (g)	200
Saturated fatty acids (g)	1		
Trans fatty acids (g)	0		
Glutamine (g)	3	Glutamine (g)	NA
Arginine (g)	0.9	Arginine (g)	NA
Taurine (g)	0.45	Taurine (g)	0.03
Selenium (μg)	50	Selenium (μg)	14
Coenzyme Q_{10} (mg)	25	Coenzyme Q_{10} (mg)	NA
Vitamin A (IU)	1150	Vitamin A (IU)	1000
Vitamin B1 (mg)	0.675	Vitamin B1 (mg)	0.75
Vitamin B2 (mg)	0.765	Vitamin B2 (mg)	0.85
Niacin (mg)	8.5	Niacin (mg)	10
Vitamin B6 (mg)	1.0	Vitamin B6 (mg)	0.75
Biotin (μg)	75	Biotin (μg)	60
Pantothenic acid (mg)	2.5	Pantothenic acid (mg)	5
Vitamin B_{12}	3.0	Vitamin B_{12}	3.0
Folic acid (μg)	220	Folic acid (μg)	80
Vitamin C (mg)	120	Vitamin C (mg)	60
Vitamin D3 (IU)	135	Vitamin D3 (IU)	80
Vitamin E (IU)	25	Vitamin E (IU)	15
Vitamin K1 (μg)	25	Vitamin K1 (μg)	25
Sodium (mg)	213	Sodium (mg)	220
Potassium (mg)	420	Potassium (mg)	380
Calcium (mg)	300	Calcium (mg)	200
Phosphorous (mg)	250	Phosphorous (mg)	200
Iron (mg)	5	Iron (mg)	3.6
Magnesium (mg)	100	Magnesium (mg)	80
Zinc (mg)	6.5	Zinc (mg)	4
Copper (μg)	500	Copper (μg)	400
Manganese (μg)	500	Manganese (μg)	600
Chromium (μg)	40	Chromium (μg)	24
Molybdenum (μg)	30	Molybdenum (μg)	20
Iodine (μg)	38	Iodine (μg)	30
Ethanzyme powder	*1 serving: 2 g*		
Components (units)	*Amount per serving*		
Calorie (kcal)	2		
Protein (g)	0.1		
Carbohydrates (g)	0.4		
Fat (g)	0		
Pineapple enzyme (g)	0.42		
Papaya enzyme (g)	0.42		
Probiotics (CFU)	8 billions		
Vitamin B1 (μg)	0.3		
Vitamin B2 (μg)	0.3		
Niacin (mg)	4.0		
Vitamin $_{B6}$ (mg)	0.4		
Biotin (μg)	60		
Pantothenic acid (mg)	2.0		
Vitamin $_{B12}$	1.2		
Folic acid (μg)	80		
Inositol (mg)	30		
Choline bitartrate (mg)	10		

NA, not available, that is, not shown in the commercial formula.

*Between-batch coefficients of variation in the proportion of each nutrition component were <1%.