ORIGINAL ARTICLES

Effectiveness of Leanpro Peptizer nutritional supplement for people with poor nutrient absorption

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ABSTRACT

Objectives: To evaluate the effectiveness of Leanpro Peptizer nutritional supplement in powder form on the health status of people with poor nutrient absorption in Ninh Bình in 2024.

Methods: A randomized controlled trial. The subjects were individuals aged 40-60 years selected according to study criteria. The study was conducted and completed in Ninh Bình province in August 2024 (from march to august). The sample size consisted of 120 people in two groups: 60 in the intervention group (supplemented with Leanpro Peptizer powder, 47g/serving, twice daily for 2 months) and 60 in the control group with a normal diet. Data were collected at healthcare facilities, and technical standards were applied to determine health status to minimize errors and control confounding factors. Data were analyzed using SPSS20.0 and statistical tests in biomedical research.

Results: The intervention group had higher levels of total protein (TP) by 3.1g/L, albumin by 2.9g/L, and hemoglobin by 10.8g/L (p<0.05). Digestive disturbances/loose stools decreased by 16.7%; loss of appetite decreased by 38.3%; bloating and indigestion decreased by 46.6%; belching and bloating decreased by 40.0%; diarrhea decreased by 35.0%; respiratory infections decreased by 15.0%; fatigue and lethargy decreased by 46.7%; dizziness decreased by 31.7%; itching decreased by 25.0%; body weight increased by 1.4 kg; and the risk of malnutrition decreased by 40.0% (p<0.05). There was a trend toward reduced anemia by 13.4% (p>0.05). 88.3% of the subjects were very satisfied with the product.

Conclusions: Supplementing Leanpro Peptizer powder for people with poor nutrient absorption over two months in Ninh Bình increased blood protein and hemoglobin levels, improved nutritional status, digestion, and overall health, with statistically significant differences compared to the control group (p<0.05).

Keywords: *Nutritional milk, Leanpro Peptizer, digestion, nutrition, multi-micronutrients.*

INTRODUCTION

Energy and micronutrient deficiencies (MND) affect absorption, metabolism, and health status, particularly in older adults, those with chronic diseases, or individuals with metabolic disorders. Nutrition influences blood biochemical balance, affects vascular health, and contributes to improved immune function against infections and the prevention of metabolic disorders (1). In individuals recovering or with poor absorption, appropriate nutritional supplementation is crucial for energy replenishment, balancing MND, and improving health status, including controlling blood cholesterol, enhancing blood proteins, and combating anemia (2). It is estimated that 20% to 50% of elderly patients and chronically ill patients are hospitalized with malnutrition, resulting in decreased quality of life, weakened immune systems, impaired lung function, and increased infection risk (3). The National Nutrition Strategy for 2021-2030,

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approved by the Prime Minister in Decision No. 02/QĐ-TTg on January 5, 2022, aims to "implement proper nutrition to improve nutritional status tailored to each group, region, and ethnic group" (4). Supplementing with energy-dense nutrition, unsaturated fatty acids, and micronutrients like vitamins and minerals can help restore health in debilitated individuals and regulate blood lipids to protect vascular health. In addition to enhancing nutrition through regular meals, patients need to supplement their energy and nutrients with convenient products, and researching appropriate, feasible nutritional supplementation methods is essential (3). The aim of this study is to assess the effectiveness of Leanpro Peptizer nutritional supplement in improving health status in people with poor nutrient absorption in Ninh Bình in 2024.

METHODS

Study design: A randomized controlled clinical trial.

Study subjects: Individuals aged 40 to 60 years of both sexes. Inclusion criteria: participants with symptoms related to poor absorption, such as indigestion, bloating, diarrhea, diagnosed with malnutrition or reduced digestive function, and willing to participate in the study. Exclusion criteria: individuals with acute progressive diseases, severe alcoholism, severe memory loss, or difficulty providing information; those involved in other studies or using similar products.

Study site and time: The study was conducted in Ninh Bình province, from March 2024 to August 2024.

Sample size and sampling methods: The sample size was calculated based on the comparison of two means.

$$n = \frac{2\sigma^2(Z_{1-\alpha} + Z_{1-\beta})}{(\mu_1 - \mu_2)^2}$$

In which:

- n: is the sample size of each group;

- $Z_{1-\alpha}$=1.96 with α=5%; $Z_{1-\beta}$=0.842 with a statistical force of 80%;

- δ is the standard deviation of 0.2 g/L;

- μ1 - μ2 the desired difference in blood protein between the two groups after intervention = 5g/L (3).

The result: n= 50 accounting for a 20% dropout rate. The sample size was 60 people per group.

Selection of subjects: 400 individuals were screened at medical facilities using consent and exclusion forms. A total of 120 individuals were voluntarily enrolled in the study. Participants were randomly assigned to either the intervention or control group.

Intervention details

The intervention group received Leanpro Peptizer nutritional supplement twice daily (97g) for two months. Each serving was 215 ml of milk mixed with 47g (6 heaping spoons) into 180 ml of water cooled to 50°C. The intervention was supervised by trained research collaborators who monitored and recorded health data and milk consumption. The product was stored at the research site and distributed to participants every 10 days. The control group received nutritional advice based on a standard family meal plan. The study subjects did not use any additional nutritional supplements and regular health check-ups.

Materials: The nutritional composition per 94 grams of milk for 1 serving, used daily: 430.52 kcal; 17.58g protein, including 3846.48mg BCAA, 1778.48mg leucine, 1116.72mg isoleucine, 951.28mg valine, 475.64mg arginine, 2977.92mg glutamic acid; 17.30g fat, including 12.78g saturated fatty acids (SFA), 12.22g medium-chain triglycerides (MCT), 2.33g monounsaturated fatty acids (MUFA),

1.22g polyunsaturated fatty acids (PUFA), 0.96g omega-6, 0.21g omega-3; 53.20g carbohydrates; 11.84mg nucleotides; 55.84mg taurine; 52.08mg L-carnitine; 216.20mg choline; 13 essential vitamins, including 329.00 IU vitamin D3, 10.43 IU vitamin E, 32.24µg vitamin K1 and B vitamins; 14 minerals, including 538.62mg calcium, 91.27mg magnesium, 5.39mg iron, 9.78mg zinc, and other essential minerals.

Evaluation methods: Blood test indices, digestive and nutritional status, and health indicators were compared before (T0), 1 month after (T1), and after the intervention (T2) between the two groups.

Study variables and qualitative research topics: Key quantitative variables included total protein (normal 60 - 80 g/L), albumin (35 – 50g/L), hemoglobin (male 130.5 - 170.5g/L; female 120.0 - 150.0g/L), weight, BMI, albumin-based nutritional indices, hemoglobin-based anemia indices, digestive and infection symptoms (digestive disturbances, loose stools, loss of appetite, bloating, indigestion, belching, diarrhea, respiratory infections, fatigue, dizziness, skin conditions, etc.). Data was collected via blood tests at local healthcare facilities and anthropometric measurements (weight, height, BMI).

Evaluation criteria and data collection: Blood test data were collected from medical facilities, including the Provincial General Hospital and several healthcare units and clinics. The laboratory testing procedures were conducted following the technical standards set by the hospital. Anthropometric data: Weight, height, and BMI were measured at the study site at both baseline and post-intervention time points. Using the clinical guidelines for digestive assessment criteria (5). A structured questionnaire was administered to participants either at the research site or at their households, carried out by trained investigators. During the intervention period, information regarding digestive, health, infection status and milk consumption were closely monitored and updated by supervisors using a record-keeping template to minimize errors and control for confounding variables.

Processing and analyzing data: Data was entered into MS Excel 2016 and Epidata 3.1, then analyzed using IBM SPSS 20.0.

Research ethics: The study was approved by the Ethics Committee of the Institute of Health Sciences and Technology in approval decision No. 75/HĐĐĐ-VKC, dated august 24, 2024. The study adhered to good clinical practice.

RESULTS

Table 1. Characteristics and demographics of study participants

Variable / Group	Intervention group (n=60)	Control group (n=60)	p-value
Demographics, blood test results	*Mean (± SD)*	*Mean (± SD)*	*t-test*
Gender (% male)	31 (51.7%)	32 (53.3%)	>0.05
Age (Year, mean ± SD)	48.2 ± 8.5	49.5 ± 9.1	>0.05
Weight (kg, mean ± SD)	51.7 ± 5.7	52.5 ± 5.9	>0.05
BMI (kg/m², mean ± SD)	20.1 ± 1.1	20.2 ± 1.2	>0.05
Total Protein (g/L)	61.2 ± 10.5	60.7 ± 9.0	>0.05
Albumin (g/L)	31.1 ± 5.6	30.5 ± 5.0	>0.05
Hemoglobin (g/L)	102.2 ± 18.2	105.4 ± 16.3	>0.05

Group / Variable	Intervention group (n=60)	Control group (n=60)	p-value
Health and nutritional status	*n (%)*	*n (%)*	*χ2 test*
Digestive issues/loose stools	15 (25.0%)	13 (21.7%)	>0.05
Poor eating / poor appetite	38 (63.3%)	36 (60.0%)	>0.05
Bloating, indigestion	42 (70.0%)	39 (65.0%)	>0.05
Belching, flatulence	37 (61.7%)	35 (58.3%)	>0.05
Diarrhea	21 (35.0%)	19 (31.7%)	>0.05
Respiratory infections	27 (45.0%)	29 (48.3%)	>0.05
Frequent fatigue	43 (71.7%)	45 (75.0%)	>0.05
Dizziness, lightheadedness	28 (46.7%)	31 (51.7%)	>0.05
Pale or dusky skin	12 (20.0%)	13 (21.7%)	>0.05
Malnutrition[1]	50 (83.3%)	52 (86.7%)	>0.05
Anemia[2]	35 (58.3%)	33 (55.0%)	>0.05

[1]Classified according to albumin; [2]Classified according to hemoglobin. Statistical significance with p<0.05.

Before the study, there were no significant differences between the two groups in terms of age, gender, weight, or BMI; the blood test results, digestive health, and nutritional status were similar between groups (p>0.05).

Table 2. Improvement in blood test results before and after intervention

Groups / Variable	Time	Intervention group (Mean ± SD)	Control group (Mean ± SD)	p-value (t-test)
Protein total (g/L)	T0	61.2 ± 10.5	60.7 ± 9.0	>0.05
	T2	64.5 ± 9.8	60.9 ± 8.9	<0.05*
	T2-T0	3.3 ± 0.7	0.2 ± 0.1	<0.05*
Albumin (g/L)	T0	31.1 ± 5.6	30.5 ± 5.0	>0.05
	T2	34.3 ± 5.9	30.8 ± 5.2	<0.05*
	T2-T0	3.2 ± 0.3	0.3 ± 0.2	<0.05*
Hemoglobin (g/L)	T0	102.2 ± 18.2	105.4 ± 16.3	>0.05
	T2	115.1 ± 16.7	107.5 ± 16.8	>0.05
	T2-T0	12.9 ± 1.5	2.1 ± 0.5	<0.05*

* Statistical significance with p<0.05.

Before the intervention (T0), there were no significant differences in the blood test results, including Protein total, Albumin, and Hemoglobin (p>0.05). After 2 months (T2), the intervention group showed higher Protein total by 3.1 g/L (3.3 ± 0.7 vs. 0.2 ± 0.1), Albumin by 2.9 g/L, and Hemoglobin by 10.8 g/L (p<0.05).

Table 3. Improvement in digestive and infectious conditions after intervention

Variable	Groups / Intervention group (n,%)	Control group (n,%)	p-value (χ2 test)
Digestive issues / loose stools	2 (3,3%)	12 (20,0%)	<0.05**
Poor eating / poor appetite	9 (15,0%)	32 (53,3%)	<0.05*
Bloating, indigestion	7 (11,7%)	35 (58,3%)	<0.05*
Belching, flatulence	9 (15,0%)	33 (55,0%)	<0.05*
Diarrhea	5 (8,3%)	26 (43,3%)	<0.05*

*Statistical significance with p<0.05; **Fisher's exact test.

After 2 months, the intervention group showed better improvements in digestive disorders, with a lower occurrence of digestive issues/loose stools (3.3% vs. 20.0%), appetite loss (15.0% vs. 53.3%), bloating/indigestion (11.7% vs. 58.3%), burping/flatulence (15.0% vs. 55.0%), and diarrhea (8.3% vs. 43.3%).

Table 4. Improvement in health status

Variable	Groups / Intervention group (n,%)	Control group (n,%)	p-value (χ2 test)
Respiratory infections	8 (13.3%)	17 (28.3%)	<0.05*
Frequent fatigue	14 (23.3%)	42 (70.0%)	<0.05*
Dizziness, lightheadedness	11 (18.3%)	30 (50.0%)	<0.05*
Itching	5 (8.3%)	20 (33.3%)	<0.05*
Sleep difficulties	6 (10.0%)	21 (35.0%)	<0.05*
Pale or dusky skin	7 (11.7%)	11 (18.3%)	>0.05

*Statistical significance with p<0.05.

After 2 months, the intervention group showed better health improvements, with lower incidence of respiratory infections (13.3% vs. 28.3%), frequent fatigue (23.3% vs. 70.0%), dizziness (18.3% vs. 50.0%), itching (8.3% vs. 33.3%), and sleep difficulties (10.0% vs. 35.0%). The incidence of dusky skin was slightly reduced in the intervention group (p>0.05).

Table 5. Improvement in nutritional status

Variable	Groups / Intervention group (n,%)	Control group (n,%)	p-value (t-test)
Weight (kg)	54.2 ± 6.1	52.8 ± 6.0	<0.05*
BMI (kg/m²)	21.5 ± 1.4	20.4 ± 1.3	<0.05*
Malnutrition[1]	25 (41.7%)	49 (81.7%)	<0.05*
Anemia[2]	23 (38.3%)	31 (51.7%)	>0.05

[1]Classified according to Albumin; [2]Classified according to Hemoglobin;

*Statistical significance with p<0.05.

After 2 months, the intervention group showed better improvements, with weight increase by 1.4 kg (54.2 ± 6.1 kg vs. 52.8 ± 6.0 kg), BMI increase by 1.1 kg/m² (21.5 ± 1.4 kg/m² vs. 20.4 ± 1.3 kg/m²). The risk of malnutrition (based on Albumin levels) was 40.0% lower (41.7% vs. 81.7%) and anemia (based on Hemoglobin levels) showed a tendency to decrease by 13.4% ($p > 0.05$).
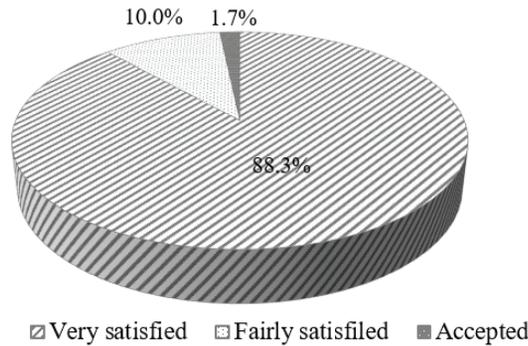

Figure 1. Level of product satisfaction in the intervention group

Assessing the level of satisfaction with using the product in 2 months, 88.3% of people were very satisfied; 10.0% fairly satisfied and 1.7% accepted.

DISCUSSION

Improvement in blood protein and hemoglobin levels

After intervention, the intervention group showed an increase of 3.1 g/L in total protein (3.3 ± 0.7 vs. 0.2 ± 0.1), an increase of 2.9 g/L in albumin, and an increase of 10.8 g/L in hemoglobin ($p < 0.05$). These improvements can be attributed to the nutritional composition and nutrient content of the intervention product, which is suitable for the physiological function of the intestinal system and the body's needs. Specifically, in the 17.58g of protein supplemented daily, there are 3846.48mg of BCAA, 1778.48mg of leucine, 1116.72mg of isoleucine, 951.28mg of valine, 475.64mg of arginine, and 2977.92mg of glutamic acid. Additionally, the product contains 17.30g of fat, which includes 12.78g of saturated fatty acids

(SFA), 12.22g of medium-chain triglycerides (MCT), 2.33g of MUFA, omega-3, omega-6, and vitamins and minerals that improve absorption, provide energy, and serve as raw materials for metabolic processes. Several studies have reported the development of transporters capable of assisting in the absorption of oligopeptides (peptides) and fatty acids through the intestine. Digestive enzymes for carbohydrates, proteins, and fats have been identified in various stages of digestion, and the types of bonds they hydrolyze are becoming clearer (6). The BCAA chain, including leucine, isoleucine, and valine, accounts for about 35–40% of the total essential amino acids involved in muscle system development. Leucine, in particular, plays a significant role in protein synthesis, while isoleucine and valine are very effective in energy production and blood sugar regulation (7). Monitoring blood albumin levels reflects health status when the body experiences frequent fatigue, digestive disturbances, loss of appetite, bloating, weight loss, and changes in stool color (8). Research has shown that enteral nutrition helps restore intestinal villi, boosts

immunity, reduces bacterial translocation, and alleviates digestive complications caused by various pathophysiological mechanisms (9). The results of this study suggest that the nutritional formula of this product is suitable for individuals with health issues related to digestion.

Improvement in digestive function, nutrition, and health

After two months, the intervention group showed improvements in digestive issues/ loose stools, which decreased by 16.7% (3.3% vs. 20.0%); poor eating / poor appetite decreased by 38.3%; bloating and indigestion decreased by 46.6%; belching decreased by 40.0%; diarrhea decreased by 35.0%. Nucleotides in the Leanpro Peptizer milk formulation play an important role alongside proteins, carbohydrates, and fats, offering several benefits such as reducing the risk of diarrhea, improving the immune system, and regulating irritable bowel syndrome (10). The intervention group received 13 vitamins and 14 minerals daily, including 329.00 IU of vitamin D3, 10.43 IU of vitamin E, 32.24 µg of vitamin K1, and the B vitamins, along with 538.62 mg of calcium, 91.27 mg of magnesium, 5.39 mg of iron, and 9.78 mg of zinc. These components help enhance the immune system, and combined with improved albumin levels, the intervention group experienced a 15.0% decrease in upper respiratory infections and statistically significant improvements in frequent fatigue, dizziness ($p < 0.05$). This result is consistent with other global studies (11`). This improvement is also linked to increased albumin by 2.9 g/L and hemoglobin by 10.8 g/L. A randomized controlled trial over 8 weeks showed that individuals with low blood magnesium levels experienced significant fatigue and stress, while those with balanced magnesium and vitamin B6 levels had much better health and psychological outcomes (12).

The positive impact on health and immunity also contributed to improved body weight, reduced itching, and improved sleep quality ($p < 0.05$), with a trend toward improved anemia, as indicated by a 13.4% decrease in hemoglobin levels. Inappropriate nutrition is also associated with poor absorption due to mediators affecting the gut microbiota and gastrointestinal function.

Product acceptance

The participants gave very positive feedback about the product, with 88.3% reporting being very satisfied, 10.0% fairly satisfied, and 1.7% accepting the product. No digestive allergies or abnormal reactions were reported during the study, even after extended use of the product.

Limitations of the study: Due to the sample size and the study's duration, this research focused on evaluating the effects of the intervention on digestive function and some health and nutritional indicators after only 2 months of supplementation. The study did not assess the long-term impact of Leanpro Peptizer on immune recovery and overall health. To evaluate these effects, a larger sample size and a longer intervention period would be necessary.

CONCLUSION

Supplementing Leanpro Peptizer powder milk for people with nutritional malabsorption for 2 months in Ninh Binh province had increased protein total, albumin and hemoglobin blood; improving digestion, nutrition and health status, statistically significant difference compared to the control group ($p < 0.05$).

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