

Congestive Heart Failure Treated with a Multiple Micronutrient Supplement Program: A Case Report

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Abstract

Congestive heart failure is a chronic progressive disorder of the cardiovascular system with loss of function of the cardiac myocytes. There is no cure and treatments only attempt to reduce the severity of symptoms. We present a case of a 50-year-old female that presented to the clinic with congestive heart failure with idiopathic primary pulmonary hypertension and New York Heart Association (NYHA) functional class IV. After adhering for eight months to the prescribed multiple micronutrient supplement program as an adjunct to conventional medication the patient experienced much improvement as measured by the Minnesota Living with Heart Failure Questionnaire (MLHFQ) and the 6-Minute Walk Test (6MWT).

Introduction

Heart failure (HF) is a progressive cardiovascular disorder where there is loss of function of the cardiac myocytes. The classical definition of HF by Braunwald is that it is the pathological state in which an abnormality of myocardial function is responsible for the failure of the heart to pump blood at a rate commensurate with the requirements of the metabolizing tissue during ordinary activity [1]. HF patients may present with a wide variety of conditions ranging from asymptomatic with mild echocardiographic abnormalities to those with unstable angina and acute pulmonary edema. However, the prime manifestations of HF are dyspnea and fatigue, which may limit exercise tolerance and cause fluid retention, which may lead to pulmonary congestion and peripheral edema [2]. For this reason, HF is also commonly referred to as congestive heart failure (CHF).

Patients with CHF are often treated with angiotensin-converting enzyme inhibitors, beta-blockers, calcium channel blockers, nitrates, statins, and diuretics. Despite advances in treatment options, patients with HF continue to have high morbidity and mortality [3]. Approximately 50% of the patients die within five years of the initial diagnosis [3].

In this report, we describe the case of a patient presenting with severe CHF and the result of treatment with a high dose multiple micronutrient supplement program.

Case Report

A 50-year-old woman presented to our integrated healthcare center in September 2014, with orthopnea, ankle swelling, and angina. Her blood pressure was 95/55 mmHg. She was diagnosed HF with idiopathic primary pulmonary hypertension in March 2013 with New York Heart Association (NYHA) functional class IV.



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An echocardiography on August 27, 2014 showed left ventricular ejection fraction (LVEF) of 58% with no evidence of hypertrophy or abnormality in the systolic function. The inferior vena cava was dilated. The right atrium was also dilated. There was presence of right ventricular strain. There was minimal pericardial effusion at anterior right ventricle and lateral right ventricle. An ultrasonography on August 29, 2014 showed mild hepatomegaly with dilatation of the inferior vena cava and hepatic veins, multiple hepatic and splenic calcifications, and right pleural effusion and minimal ascites. CECT thorax on September 2, 2014 showed right cardiac insufficiency secondary to pulmonary arterial hypertension with liver congestion, pulmonary veno-occlusion, right pleural effusion, and pericardial effusion.

The patient was on the following medications:

1. Sildenafil 25 mg – twice daily
2. Furosemide 40 mg – twice daily
3. Spironolactone 12.5 mg – twice daily
4. Potassium chloride 600 mg – twice daily

The patient was prescribed a specific multiple micronutrient supplement program taken three times a day, in addition to twice daily pharmaceutical medications. Table 1 shows the list of micronutrients in the supplement program.

Quality of life outcome measure

In conjunction with the objective therapeutic measures, this case study utilized a quality of life (QOL) measure, the Minnesota Living with Heart Failure Questionnaire (MLHFQ), for therapeutic outcome. The MLHFQ is a validated patient-reported outcome measurement tool used in measuring patient-perceived changes in symptoms, functional limitations, and psychological distress scored on a 0 to 5 Likert scale. The measures were combined to provide scoring by two dimensions (physical function and emotional), and an overall profile score (global) that allowed for quantifiable assessment of overall change over time. The MLHFQ was used to record severity

Table 1: Composition of micronutrient program

Ingredient	Compound	Daily dose
Vitamin A	Natural mixed carotenoids	1,584 IU
Vitamin C	Ascorbic acid, ascorbyl palmitate, calcium ascorbate, magnesium ascorbate	2,450 mg
Vitamin D3	Cholecalciferol	130 IU
Vitamin B1 (Thiamin)	Thiamin mononitrate	22 mg
Vitamin B2 (Riboflavin)	Riboflavin	22 mg
Vitamin B3 (Niacin)	Niacin, niacinamide	75 mg
Vitamin B5 (Pantothenic acid)	Calcium D-pantothenate	80 mg
Vitamin B6 (Pyridoxine)	Pyridoxine HCl	14 mg
Folic acid		90 mcg
Vitamin B12	Cyanocobalamin	27 mcg
Vitamin E	Mixed tocopherol, D-alpha tocopheryl succinate	300 iu ?IU
Biotin		195 mcg
Calcium	Calcium glycinate, dicalcium phosphate, calcium ascorbate	322 mg
Phosphorus	Dicalcium phosphate	15 mg
Magnesium	Magnesium ascorbate	510 mg
Zinc	Zinc glycinate	7 mg
Selenium	L-selenomethionine	20 mcg
Copper	Copper glycinate	0.3 mg
Manganese	Amino acid chelate	1.3 mg
Chromium	Chromium glycinate	10 mcg
Molybdenum	Molybdenum glycinate	4 mcg
Potassium	Amino acid chelate	20 mg
L-lysine	L-lysine HCl	1,110 mg
L-proline		110 mg
L-arginine	L-arginine HCl	790 mg
L-cysteine	L-cysteine HCl	35 mg
L-carnitine	L-carnitine tartrate	195 mg
Taurine		200 mg
Bioflavonoid	Citrus fruit peel bioflavonoid complex	410 mg
Inositol		35 mg
Mixed tocopherols	Beta, gamma, delta tocopherols	25 mg
Coenzyme Q10		27 mg
Pycnogenol		7 mg
Mixed carotenoids	Alpha carotene, lutein, zeaxanthin, cryptoxanthin	68.5 mcg

during the initial case taking and on each scheduled monthly return visit. A positive change of 5 points in the MLHFQ would have a clinically significant effect [4].

Clinical progression

Compliance with the nutritional supplement program was monitored during each follow-up visit. After one month of the intervention, the patient felt more energetic. However, stiffness and

pain in the fingers that was present on admission were aggravated. There was no improvement in all other symptoms. After two months, edema in the lower extremities, angina, and orthopnea were much reduced. During the third month, the patient was admitted to the hospital due to a high fever, which aggravated her symptoms. Four months after therapy the patient was able to walk without symptoms, and was able to perform light work. Symptoms improved further after eight months and patient assessment revealed that she was in NYHA class I.

6 minute walk test

The initial 6-minute walk test (6 MWT) was conducted and the patient had to stop at 5 minutes after covering a distance of 75 meters in the hospital ward corridor. Blood pressure (BP) changed from 126/58 to 115/72 mmHg. The pulse rate increased from 80 to 113 beats per minute. After eight months of the nutritional supplement intervention, another 6 MWT showed an improvement and the patient was able to complete the 6 MWT and covered a distance of 450 meters. BP increased from 95/65 to 110/75 mmHg and her pulse rate increased from 71 to 88 beat per minute.

Data from MLHFQ

The patient was followed for eight months and at the endpoint she was still on the treatment protocol. During each monthly follow-up visit the MLHFQ was applied. The patient answered all 21 questions in the questionnaire. For the first six months only the English version of the MLHFQ was used. During the seventh and eighth months the Malay version was also used. The answers derived from the Malay version did not differ from the answers given in the English version or those given in the first six months. Table 2 summarizes the results of the MLHFQ for physical function and emotional dimensions, as well as the global or overall profile scores.

Discussion

The patient was initially on appropriate medications for CHF but her condition continued to deteriorate over the next two years. From the MLHFQ data, there was a positive change in score for physical function dimension (26 points), emotional dimension (11 points), and overall profile (70 points). The mean change for the three dimensions was 35.67 ± 30.66. Rector and colleagues had suggested that a positive change of 5 points or more for the total score would be considered as clinically significant [4]. In this case study, the change of total overall score of 70 points is much higher than the 5 points suggested.

This case study used a high (above the RDAs) dosage of the

Table 2: Change for MLHFQ physical function, emotional dimensions, and global score from start to endpoint.

	Start	Endpoint	Change
Physical function dimension	27	1	26
Emotion dimension	11	0	11
Global (overall profile)	71	1	70
Total	109	2	107
Mean (SD)	36.33 (31.07)	0.67 (0.58)	35.67 (30.66)

multiple micronutrients. It also used multiple amino acids such as L-lysine, L-proline, L-arginine, L-carnitine, L-cysteine, and taurine, which are important nutrients for cardiac functions.

Furthermore, the vitamin C dosage used in this study was also high. Vitamin C is important, and it has been shown in a large-scale observational study that the risk of HF decreases with increasing plasma vitamin C [5]. Furthermore, the use of vitamin C, lysine and proline is crucial for production of collagen and protection of the endothelium of the artery walls [6].

An important indication of good prognosis is that the patient feels more energetic even though the pathological symptoms may aggravate or show no sign of improvement. This was shown to be present in this study. Taegtmeier has postulated that the deprivation of cardiac bioenergy has a major role in HF [7]. The heart consumes more energy than any other organ. This bioenergy is provided by the biochemical conversion of glucose and fatty acids into mechanical energy supporting the heart muscle functions.

The use of the Malay version together with the English version of the MLHFQ in this case study supports its validation. To our knowledge, there has been no other study on HF that has used the Malay version of the MLHFQ.

This clinical study has some limitations. Top among those is that it relies primarily on MLHFQ and 6MWT as outcome measures. It would have been better if the pulmonary vascular resistance were also measured for pre and post treatment comparison. Availability of data on hemoglobin and liver function would have strengthened the

observations, but not.

In conclusion, this case study suggests that a large randomized control study could be beneficial to assess the use of a multiple micronutrient supplement program as an adjunct to conventional treatment for CHF due to primary pulmonary hypertension. More studies are needed to investigate the efficacy and safety of the nutrients.

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