

CASE REPORT

Presarcopenia and chronic cough due to chronic obstructive pulmonary disease successfully treated with nutraceutical supplements and physical exercise

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ABSTRACT

Objective: To describe a patient with presarcopenia and chronic cough secondary to chronic obstructive pulmonary disease (COPD) successfully treated with supplements and physical exercise.

Case report: A 75-year-old female patient with a positive past medical history of systemic hypertension, dyslipidemia, heart arrhythmia, and smoking during 20 years evolved with chronic cough due to a chronic obstructive pulmonary disease diagnosed ten years ago. She came to our private clinic due to low weight, low energy. Her weight was 44.8 kg, her height 1.57 m, body mass index of 18.18 kg/m². Laboratory tests showed SDHEA 76.3, vitamin D of 15.6 ng/ml (nr: > 30 ng/ml), C-reactive protein (CRP) of 55 mg/ml. Computed tomography showed bronchiectasis. She had an skeletal muscle mass index of 5.0 kg/m² (nr: > 5.5 kg/m²) by DXA. A diagnosis of presarcopenia was determined based on DXA evaluation with low muscle mass but normal gait speed handgrip strength. We suggested to the patient to increase physical exercise and prescribed a supplement formula. After five months, she returned asymptomatic, without cough, marked improvement of fatigue, increased energy levels, and weight increased to 50 kg, BMI of 20.28 kg/m². Laboratory tests showed SDHEA to 140, vitamin D3 to 64.5 ng/ml, reduced CRP reduced to 5 mg/dl, and amlodipine was excluded due to better blood pressure control. Currently, two years later, the patient continues without cough and has dyspnea only with high efforts, without fatigue, and her weight is 52 kg and BMI 21.1 kg/m². She also reduced her conventional treatment for COPD, using only a bronchodilator on-demand, without topical corticoids.

Conclusions: This case illustrates an interesting case of a patient with presarcopenia and chronic cough, refractory to conventional approach, successfully treated with a combination of nutraceuticals and physical exercises.

Key Words: Sarcopenia, Low weight, Chronic obstructive pulmonary disease, Bronchitis, Vitamin D, Supplements

1. INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a chronic respiratory disorder linked to smoking. COPD is divided clinically into two spectra: bronchitis and emphysema.

For chronic management of COPD is recommended smoking cessation, nutritional follow-up, vaccines, and some

drugs. The pharmacological approach includes bronchodilators and inhaled corticoids; and for frequent exacerbations, mucolytics, roflumilast (inhibitor of phosphodiesterase), or azithromycin.^[1] Therefore, new therapeutic agents or approaches are welcome in this pulmonary condition.

COPD may lead to a reduction of muscle mass, and this

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condition is called sarcopenia. It was verified in a metanalysis that included 10 articles, with 2,565 patients, and the authors found a frequency of sarcopenia that varied from 8% to 21% of COPD subjects in the outpatient scenario and 63% inpatient residing in nursing houses.^[2]

Sarcopenia treatment modalities include resistance exercises in combination with a protein intake of 1 to 1.5 g/kg/day, as stated in the consensus of the Society of Sarcopenia, Cachexia and Wasting Disorders.^[3]

New modalities of treatment are desired for refractory cases. In this line, the inclusion of several nutraceuticals with low risk of side effects to these COPD patients' diary routine suffering from sarcopenia would be an additional possibility at the individual level.

This article aims to report a patient with sarcopenia and COPD successfully and quickly treated with nutraceutical supplements and physical exercises.

2. CASE PRESENTATION

A 75-year-old female patient with a positive past medical history of systemic hypertension, dyslipidemia, heart arrhythmia, and smoking for 20 years evolved with chronic cough due to a chronic obstructive pulmonary disease diagnosed twenty years ago. She was under amlodipine 5 mg/day, losartan 50 mg/day, simvastatin 20 mg/day, amiodarone 200 mg/day, calcium citrate malate 250 mg/day, and budesonide and formoterol inhaled once a day. She practiced Pilates exercises and walking 20 minutes twice a week. She received an influenza vaccine every year. She came to our private clinic due to low weight and low energy levels. Her physical examination demonstrated a thin patient with a weight of 44.8 kg, height 1.57 m, body mass index of 18.18 kg/m²; pulmonary auscultation showed reduced pulmonary sounds diffusely, no whizzing listened, and a diffuse reduction of muscle mass. A dietist consultation informed us that her protein ingestion was 1.2 g/kg/day (adequate). Laboratory tests showed normal cell blood count, total cholesterol of 204 mg/dl, HDL-c 50 mg/dl, LDL-c 133 mg/dl, triglycerides 107 mg/dl, glucose 103 mg/dl, insulin 4.1 U/ml, testosterone of 10.0 ng/dl (nr: 12-60 ng/dl), SDHEA 76.3 mcg/dl (optimal value: 95.8-511 mcg/dl), 25-OH-vitamin D of 15.6 ng/ml (nr: > 30 ng/ml), C-reactive protein (CRP) of 55 mg/ml, TSH 1.97 mU/ml (nr: 0.4-4.5 mU/ml), free T3 2.38 nd/dl (optimal value: 3.0-4.0 ng/dl), free T4 1.4 ng/dl (nr: 0.7-1.8 ng/dl). Anti-TPO and anti-thyroglobulin were negative. Serologies for syphilis, hepatitis B and C, cytomegalovirus, Epstein-Barr, rubella, HIV 1 and 2, and HTLV I and II were all negative. A Doppler ultrasound of the thyroid showed multiple nodules and cysts. Computed tomography revealed several bronchiectases. She

had an appendicular skeletal muscle mass index of 5.0 kg/m² (nr: > 5.5 kg/m²) measured by dual-energy X-ray absorptiometry (DXA). A diagnosis of presarcopenia was determined based on DXA evaluation with low muscle mass but normal gait speed > 0.8 m/sec and normal handgrip strength. We suggested to the patient to increase physical exercise (Pilates exercise and walking 30 minutes) three times a week and prescribed the following supplement formula: omega-3 4 g/day, vitamin D3 10,000 IU/day, whey protein two scups per day, Lugol's solution 4 drops/day (24 mg of iodine), and 7-keto-DHEA 100 mg/day. After five months, she returned asymptomatic, without cough, marked improvement of fatigue, increased energy levels, weight increased to 50 kg, and BMI of 20.28 kg/m². Laboratory tests showed an increased of free T3 to 3.01 pg/dl, SDHEA to 140, vitamin D3 to 64.5 ng/ml, and HDL-c to 75 mg/dl; and a reduction of CRP reduced to 5 mg/dl, glucose to 80.3 mg/dl, total cholesterol to 178 mg/dl, LDL-c to 95 mg/dl, and triglycerides to 105 mg/dl was noted. Lugol's solution was reduced to 2 drops/day (12 mg of iodine), and amlodipine was excluded due to better blood pressure control. Currently, two years later, the patient continues without cough and has dyspnea only with high efforts, without fatigue, and her weight is 52 kg and BMI 21.1 kg/m². She could not repeat the DXA due to COVID-19 pandemics. She also reduced her conventional treatment for COPD, using only a bronchodilator on-demand, without topical corticoids.

3. DISCUSSION

This article reports a patient who suffered from presarcopenia and chronic cough due to COPD and was successfully treated with several nutraceuticals and Pilates exercise plus walking.

The European Consensus defined sarcopenia as "a muscle disease (muscle failure) rooted in adverse muscle changes that accrue across a lifetime."^[4] This muscle entity is classified as presarcopenia (when only low muscle mass is detected); sarcopenia (when low muscle mass plus one of the following: low strength muscle or low physical performance); or severe sarcopenia when all three criteria are fulfilled.^[4] COPD may induce sarcopenia via several chronic hypoxia mechanisms, malnutrition, intestinal absorption reduction, glucocorticoid use, chronic inflammation, and oxidative stress.^[5]

When the physician deals with sarcopenia, aspects like the ingestion of food and comorbidities are very relevant. In our patients' case, COPD was probably the main reason for the low weight and sarcopenia. In fact, in a cross-sectional study in 80 patients with stable COPD, the authors found 25% of sarcopenia, and this muscle alteration was associated in a multivariate analysis, like old age, lower body mass index,

presence of cardiovascular comorbidities, and higher tumor necrosis factor (TNF) levels.^[6,7] All these factors were observed in our patient; although we did not measure TNF, it is known that CRP levels are correlated with TNF, and her CRP values were very high.

A combination of strategies was used in our patient since she practiced physical exercise, had adequate protein ingestion and did not have an excellent clinical response. Indeed, we asked her to increase physical activity and supplement the patient with vitamin D since we observed low serum levels. Moreover, considering that there is evidence in the literature about this vitamin deficiency in sarcopenia. In fact, a systematic review of 12 studies with a total of 22,590 individuals included in the analysis confirmed low vitamin D levels in sarcopenic subjects.^[8] Furthermore, a randomized, prospective, double-blinded trial demonstrating that handgrip strength was improved, and the timed get up and go (TGUG) test and body fat content were decreased when a vitamin D3 supplementation was added to the conventional treatment in middle-aged women presenting low levels of vitamin D.^[9]

Concerning omega-3 supplementation, several studies have evaluated this fatty acid's therapeutic role in dyslipidemia and found excellent results. The positive lipid alterations after omega-3 intake are a decrease in triglycerides of 29%, total cholesterol of 11.6%, VLDL-c of 30.2%, and LDL-c of 32.5%. And an increase of HDL-c of 10%.^[10] Furthermore, there is a randomized placebo-controlled clinical trial using omega-3 supplementation for 53 elderly with sarcopenia than placebo, but no significant differences were observed in both groups.^[11] Maybe the low omega-3 dose (1.3 g) used in this study may justify the lack of results.

The use of whey protein in sarcopenia treatment was evaluated in a Finnish randomized placebo-controlled study, including 106 people residing in a nursing home, mainly at risk of malnutrition. These subjects received 20 g/day of whey protein, obtained a positive effect on muscle mass, reduced required assistance, and increased general well-being in the active group compared to the placebo group.^[12] Interestingly, whey protein was already used in COPD patients, and in that study, the author performed a single-blinded placebo-controlled trial with 40 COPD patients. They found after 8 weeks an increase of fat-free mass, body protein, handgrip strength, and quality of life, and in the opposite, a decrease in interleukin-6 levels, a pro-inflammatory cytokine.^[13]

Low ingestion of iodine was observed in more than 80% of long-term residents of care homes, people at the highest risk of sarcopenia, in a Spanish study.^[14] In our patient, the Lugol's solution was prescribed due to nodules and cysts in her thyroid. It is an effective treatment for these thyroid

abnormalities.^[15]

Regarding DHEA, a positive association among DHEA and muscle mass, muscle strength, mobility, and lower risk for falls have been described in elderly subjects.^[16] DHEA supplementation positively affects muscle mass, muscle strength, and physical performance.^[17] Most studies show a very satisfying safety profile for DHEA supplementation. Only minimal effects such as mild acne, seborrhea, facial hair growth, and ankle swelling have been reported in women.^[18] A ratio of cortisol/SDHEA ≥ 0.2 was described to implicate a high risk of sarcopenia in elderly diabetic patients.^[19] Our patient had a ratio of 0.25 (cortisol 19 mcg/dl, and SDHEA 76 mcg/dl), then she was at high risk of sarcopenia. We agree with Samaras et al. regarding DHEA supplementation, and the author wrote: "For the future, the role of DHEA supplementation in specific indications such as sarcopenia, falls and rehabilitation protocols, osteoporosis, mood, and cognitive disorders, and also sexual well-being needs to be better studied in longer and larger studies. Finally, physicians prescribing DHEA should consider and inform their patients of the fact that long-term effects concerning efficiency, but also safety, are still uncertain."^[20]

We believe that sarcopenia was a determinant factor in our patient since few effective treatments are available for COPD. We thought that improving the patient's muscle mass could have a good response, confirmed in our patient. She did improve, and the signs and symptoms of COPD were reduced after sarcopenia treatment.

Future randomized and controlled studies with the combined use of vitamin D, omega-3, whey protein are needed. Moreover, studies with DHEA supplementation and omega-3 are scarce, and therefore, needed to be tested in sarcopenic patients.

In conclusion, the present case brings an alternative, safe and efficacious treatment of presarcopenia and COPD symptoms using nutraceuticals and physical activity.

ETHICAL STATEMENT

The authors declare that they followed the World Medical Association Declaration of Helsinki in this study. An informed consent was obtained from the patient for publication of her case. No image of her is used.

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CONFLICTS OF INTEREST DISCLOSURE

The authors declared no conflicts of interest.

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