MODIFICĂRI ALE COMPOZIŢIEI CORPORALE LA PACIENŢII CU MUCOVISCIDOZĂ, DUPĂ PROGRAME COMPLEXE DE KINETOTERAPIE RESPIRATORIE

CHANGES OF BODY COMPOSITION IN PATIENS WITH CYSTIC FIBRROSIS AFTER A COMPLEX PHYSIOTHERAPY PROGRAM

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Key words: *cystic fibrosis, physiotherapy, body composition*

Abstract. Treatment of lung problems remain the major difficulty in cystic fibrosis (CF) treatment, but the quality of life of CF patients depends on several factors including: nutritional status, physical and social functioning, emotional responses, interpersonal relationships and body image. **Aim.** The purpose of this study is to improve the body composition of patients with cystic fibrosis through a new and complex strategy: individualized exercise training programme, chest physiotherapy and incentive therapy. **Methods.** This study was conducted in the Romanian National CF Centre in 2008-2011, and the study lot was represented by a number of 20 patients, aged between 12 years and 21 years. The evaluation consisted in the assessment of body composition at the beginning of the study and after 6 months, with the help of In-Body 720 multyfrequency bioimpedance device. All CF patients from the study follow an supervised rehabilitation programme of 3 weeks consisted in individualized exercise training programme, chest physiotherapy and incentive therapy. The rehabilitation programme was conducted by 4 physical therapists under supervision of a medical doctor and included: classic daily physiotherapy techniques of clearing (5 times a week); individualized exercise programmes (3 times a week); incentive therapy (3 times a week using TrainAir system).

Cuvinte cheie: *mucoviscidoză, kinetoterapie, compoziţie corporală.*

Rezumat. Suferinţa pulmonară reprezintă principala cauză de morbiditate şi mortalitate şi impune un tratament adecvat, dar calitatea vieţii pacienţilor cu mucoviscidoză depinde şi de: statusul nutriţional, funcţia socială şi fizică, răspunsurile emoţionale, relaţiile interpersonale şi imaginea corporală. **Scop.** Scopul studiului este de a îmbunătăţi compoziţia corporală la pacienţii cu mucoviscidoză printr-o stategie complexă ce presupune: fizioterapie respiratorie, antrenament fizic individualizat şi terapie incitativă. **Material şi Metodă.** Studiul s-a desfăsurat la Centrul Naţional de Mucoviscidoză din Timişoara, în perioada 2010-2011 şi a cuprins 20 de pacienţi cu vârsta între 12-21 de ani. Evaluarea rezultatelor s-a realizat cu ajutorul bioimpedanometriei (In-Body 720). Tratamentul a constat în şedinte zilnice de fizioterapie respiratorie (de 5 ori pe săptămână), programe individualizate de antrenament (de 3 ori pe săptămână) şi terapie incitativă (de 3 ori pe săptămână, cu ajutorul Sistemului TrainAir). **Rezultate şi discuţii.** Combinând cele trei tehnici moderne de fizioterapie am observat îmbunătăţirea statusului clinic cu o creştere a nivelului de fitness şi o ameliorare semnificativă a compoziţiei corporale: creşterea greutăţii: (de la 44.84±16.06 Kg la 46.23±16.38 Kg, p=0.0023) şi a masei musculare scheletale (de la 20.23±7.23 Kg la 22.03±7.28 Kg, p=0.0002). **Concluzii.** Optimizarea compoziţiei corporale se poate realiza prin asocierea tehnicilor de kinetoterapie respiratorie, terapie incitativă şi antrenament fizic individualizat.

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Background

Treatment of lung problems remain the major difficulty in cystic fibrosis (CF) treatment, but the quality of life of CF patients depends on several factors including: nutritional status, physical and social functioning, emotional responses, interpersonal relationships and body image.(1-3) Body composition is an important component of nutritional and fitness assesment in cystic fibrosis and is corelated with quality of life of those patients. Several studies showed that cystic patients have a low body mass index and impaired lean body mass.(4)

Aim

The purpose of this study is to improve the body composition of patients with cystic fibrosis through a new and complex strategy: individualized exercise training programme, chest physiotherapy and incentive therapy.

Methods

This study was conducted in the Romanian National CF Centre in 2008-2011, and the study lot was represented by a number of 20 patients, aged between 12 years and 21 years.

The evaluation consisted in the assessment of body composition at the beginning of the study and after 6 months, with the help of In-Body 720 multyfrequency bioimpedance device. An example of the parameters obtained after body composition evaluation in a CF patient from the study is presented in Figure 1.

All CF patients from the study follow an supervised rehabilitation programme of 3 weeks consisted in individualized exercise training programme, chest physiotherapy and incentive therapy. The rehabilitation programme was conducted by 4 physical therapists under supervision of a medical doctor and included: classic daily physiotherapy techniques of clearing (5 times a week); individualized exercise programmes (3 times a week) - Figure 2; incentive therapy (3 times a week using TrainAir system) - Figure 3.

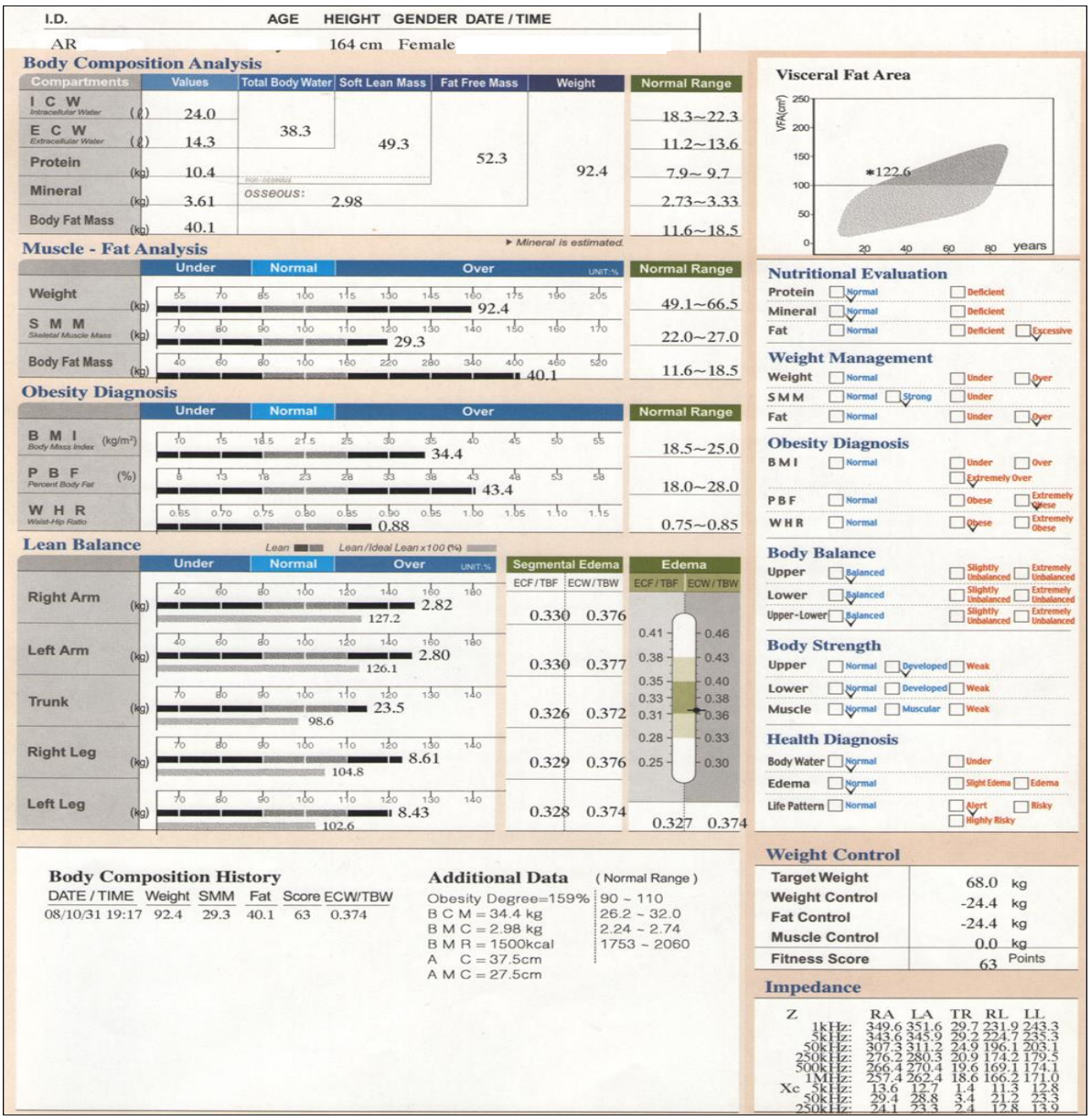

Figure 1. Example of the parameters obtained after body composition evaluation in a CF patient from the study using the multyfrequency bioimpedance device In-Body 720.

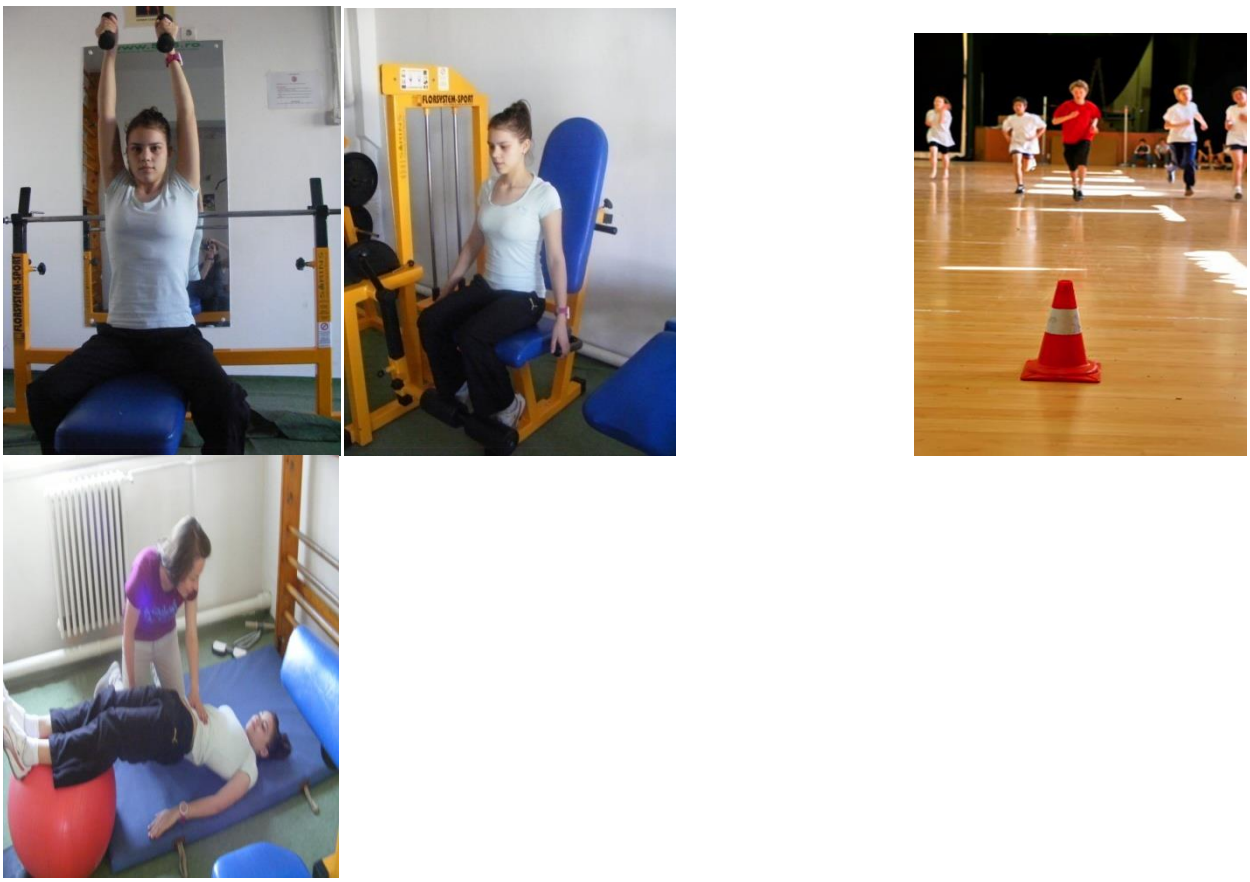

Figure 2. Individualized exercise training of CF patients from the study

The Airway Clearance Techniques used during the rehabilitation programme were: Active Cycle of Technical Breathing, Autogenic Drainage, Positive Expiratory Pressure, Bottle PEP, Flutter therapy, RC Cornet, Huff and coughing, High Chest Wall Oscillating and Modified Postural Drainage.

TrainAir® is the high-tech training aid which can improve fitness and increase exercise capacity, and is suitable for people of all ages and abilities. This kind of therapy is named incentive technique.

TrainAir is the high-tech respiratory muscle training aid which can increase exercise capacity and give better breath strength. During a Training Session, the exercise will be repeated many times with the Sustained Maximum Inspiratory Pressure at 80% of maximum, with timed rest periods between exercises.

Figure 3. Incentive therapy using TrainAir computerised system

Figure 4. Positive expiratory pressure with Flutter device

Because the patients from the study are cooming to Romanian National CF Centre from diferent Romanian countys we trained them and their caregivers in order to continue to performe a home-based rehabilitation programme with the aim of improving body composition and life quality. Therefore, all CF patients were encouraged to: participate in aerobic activities (walking, jogging, cycling, swimming and anaerobic activities: sprints, weight training and games), use Airway Clearance Techniques and respiratory muscle training devices (Flow-ball and Powerbreathe Medic, TrainAir device)

In order to rich our purpose regarding the body composition the subjects benefit by general dietary recommendations (increase caloric, protein, liquids and minerals intake).

Results and discussions

After performing the 6 months complex rehabilitation programme (3 weeks inpatient and 23 outpatient) we observed improvement in clinical respiratory status of CF patients, a higher fitness level (subjective assessed by interview the patients about performing the daily living activities) and significant improvements of body composition. (Table I, Figure 5).

Table I. Body composition improvements after 6 months of rehabilitation

Parameters	**Baseline**	**6 months**	**P value**
Weight (Kg)	44.84±16.06	46.23±16.38	p=0.0023
Skeletal muscle mass (Kg)	20.23±7.27	22.03±7.28	p=0.0002
Extracellular water (l)	10.60±3.274	11.47±3.478)	ns
Intracellular water (l)	17.08±5.55	17.82±6.59	Ns

The values are presented as mean ± standard deviation.

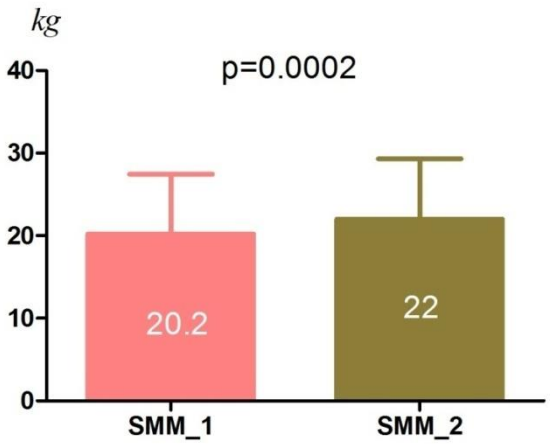

Figure 5. Skeletal muscle mass evolution after 6 months of intervention.
The values are presented as mean with standard deviation.
SMM: skeletal muscle mass at baseline (SMM_1)
and after 6 months of rehabilitation (SMM_2)

Even body water of patients were not improving significantly, it shows an improvement of liquids and mineral intake of patients. This will bring major improvements in facilitating the airway clearance and pancreatic exocrine function. Patients with chronic lung disease, as cystic fibrosis, productive of sputum were encouraged to drink a large amount of liquids. This facilitated the sputum production and enhanced fitness capacity. (Figure 6-7).

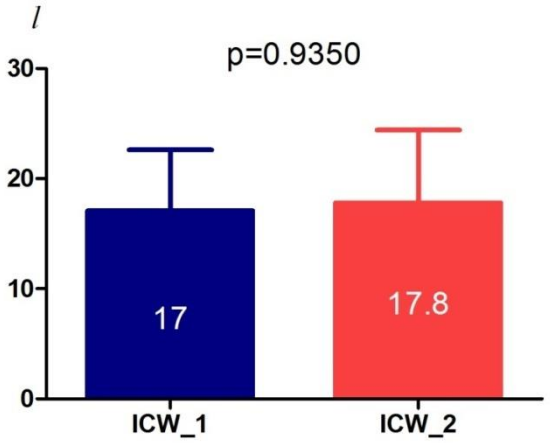

Figure 6. Intracellular water evolution after 6 months of intervention.
The values are presented as mean with standard deviation.
ICW: Intracellular water at baseline (ICW_1) and after 6 months of rehabilitation (ICW_2)

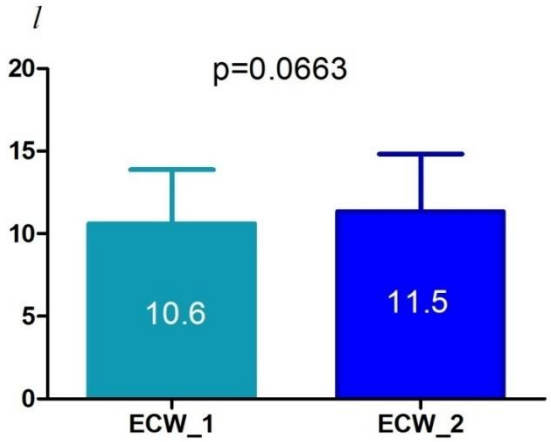

Figure 7. Extracellular water evolution after 6 months of intervention.
The values are presented as mean with standard deviation.
ICW: Extracellular water at baseline (ECW_1) and after 6 months of rehabilitation (ECW_2)

Low level of extracellular water at baseline showed us that the majority of patients were acute dehydrated before, during and after the training.

Exercise promote the formation of the muscles, improve energy for activities of daily living and enhance the lung function. Nutritional supplements, balanced diet rich in calories, fat, proteins, vitamins and minerals is necesary in CF patients especially during effort. Researches shows that teenagers with CF drinks 50% less than healthy ones. We recomend at least 2.5 liters / day of high salted drinks. When the electrolytes are going down , CF patients don't feel the sensation of thirsty. We recomanded them to drink isotonic drinks before, during and after the trainings and to increase calories with 40 %.(5,6)

We realize that the increase of body mass and fitness level could be obtain through an adequate nutrition and supervised exercise trainings wich encourage good posture, avoid musculoskeletal complications and can increase endurance and allow a good small changes regarding body water.(4)

Conclusions

Nutritional status is a predictor of survival in patients with cystic fibrosis (CF).(7)

Combining airway clearance techniques, individualized physical activities and incentive techniques could optimize the body composition in patients with cystic fibrosis. This complex protocol of physiotherapy must be included in the daily program of any patient with cystic fibrosis and must be conducted by parents not only by physiotherapists in order to enhance the quality of life.

Physical exercise is just as important as aiway clearance therapy or chest therapy, but the adherence is higher. We can motivate CF teenagers, who are sometimes reluctant to physiotherapy techniques, to participate in sport activities and change the diet and hydration habits in order to improve the quality of life.

Funding acknowledgement: This study was supported by UEFISCDI, TE/cod 36, Nr. Contract. 13/09.08.2010

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