



Trampoline Jumping – A fun and Effective Treatment in Patients with Cystic Fibrosis

**Margareta Sahlberg
Physiotherapist
Institute of Clinical Sciences
Göteborg, Sweden**



The daily physiotherapy treatment of patients with cystic fibrosis, individually tailored inhalation therapy and airway clearance is time consuming. There are a variety of airway clearance techniques (ACT) to use aiming to move and evacuate mucus from the lungs and they have extensively been reported in this journal. The treatment starts immediately when the patient is diagnosed, and continues every day including during holidays. Most patients are diagnosed before they are two years old and most of the ACT's are not suitable for a small child.

Children love to move around and to play, both with friends and by themselves. There is no difference if you are a child with cystic fibrosis. As caregivers we need to be aware of this and minimize the time the treatment takes. Every treatment session with a child is a challenge. Will the efficiency from the treatment be 100%, 10 % or even less? Does the child co-operate and if not, why? How can I as a caregiver increase the efficiency of the treatment? Maybe I can create a session with more fun and thereby stimulate the patient better?

The Swedish physiotherapy treatment program for the children with CF has for the last 20 years been going through a constant change for the better. The changes are based upon what we learned through the 1980's. A number of studies compared conventional chest physiotherapy (postural drainage and percussion) with physical exercise (Orenstein et al (1983) and Zach et al (1982)). In Stockholm, Blomquist et al (1986) compared "self treatment", including percussion and drainage, huffing and physical exercise 2x15 minutes per day, with conventional chest physiotherapy. Andreasson et al (1987) in Lund compared physical exercise comprising sit-ups, rope skipping or trampoline jumping in combination with swimming, jogging or ball games 30 minutes per day, with conventional chest physiotherapy. In both Swedish studies the results showed no difference in pulmonary function between the methods. The investigators concluded that conventional chest physiotherapy could be replaced by efficient physical activity.

In Norway, Stanghelle et al studied short bouts of trampoline exercise totalling 109 minutes per week, during 8 weeks in 8 children with CF. Pulmonary tests showed minor changes but a significant increase in forced vital capacity (FVC) after the study. Stanghelle et al concluded that trampoline exercise programs could replace other types

of training to avoid monotony. These studies also concluded that patients with more advanced disease could exercise safely and even increase pulmonary function. In all of the published studies both patients and parents expressed appreciation with the new programs and reported increased compliance.

Based on this knowledge we decided to replace the conventional chest physiotherapy, which for the patient is a rather passive treatment, with a more active treatment comprising an increased amount of physical exercise. The exercise program includes mobility of all joints including the chest, strengthening of the surrounding muscles as well as activities loading the cardio respiratory system to increase ventilation. Training principles such as duration, intensity and frequency are taken into account when designing exercise programs with a great deal of variety. Only the imagination limits what can be created for the individual patient. The programs also include breaks where the patient is encouraged to evacuate sputum with a huff or cough. The programs are continuously evaluated and improved. Personally tailored home exercise programs are made after a home visit, with familiarisation with the child's home and surroundings. such as: Are there stairs to climb or jump on? Is rope skipping possible even on a trampoline? Is there a backyard that can be used etc?

We found the trampoline to be a very useful tool when tailoring these programs. We use a trampoline 150 cm in diameter, made of a steel construction and with a rubber mat and a thick elastic rope to tighten the elasticity of the mat. We found jumping on a smaller sized trampoline is too hard to manage for younger children, as balance and coordination are not yet fully developed. Even in a small apartment it is possible to store a trampoline under the bed or on hooks in the ceiling. Every patient, from 1½ years has a trampoline to use in their daily treatment. Together with the patient and his/her family we tailor a program on the trampoline according to the patients' age and status.

In the photo below you see Tobias, 1½ years old, jumping with his older brother the day the trampoline was delivered. At that age there is of course a need for assistance to ensure efficiency of the treatment. Here in the photo the trampoline is introduced more as a future tool. Today, 11 years later, Tobias is an expert on the trampoline, performing different jumps and is even able to rope skip on it.

The *duration* of the physical exercise, after inhalation therapy, should be 30 minutes per day. If there is a prescription for inhalation therapy twice a day it is possible to exercise for 15 minutes at each occasion. When the family chooses to use the trampoline, the program consists of exercises for the whole body including chest mobility such as twist jumps with arm swings. All jumping exercises, where you include arm swings above the head e.g. vertical ski jumps increase





shoulder mobility .. Muscle strengthening and mobility of the lower limbs are reached with all forms of jumping. The *intensity* in the program should be sub maximal (70-80% of maximal heart rate). At the annual check-up, patients from the age of 6 perform an exercise capacity test on a cycle ergometer and that test gives us the heart rate. The starting *frequency* of each exercise is low, 10-12 jumps, and is increased progressively. The program is performed once to twice per day according to status and symptoms of the patient.



Bacterial lung infections may cause major problems both for the child and the caregiver. In Sweden, patients with CF used to be hospitalized during an exacerbation with intra venous antibiotic course (IVAC) and an increased treatment of conventional chest physiotherapy. The policy now is to treat early when the child has mild symptoms. The child does not need to be hospitalized even during an IVAC. The treatment is managed at home. During an IVAC course at home the child can continue with the daily activities, such as go to school and meet friends, which are of great importance to them. And thus it is also possible to continue with the tailored exercise program even during the IV treatment. You can see this on the photo of Aferdita exercising on the trampoline with a peripheral vein catheter in her left forearm.

Aferdita is today one of the best table tennis players of her age, now 16 years old, in West Sweden. Now and then she still uses the trampoline to get more variety in her training program.

To avoid accidents we strongly emphasize that the child should be supervised at all times. To our knowledge there has not been any accident among our patients.

There are studies reporting an increased risk of developing osteoporosis in patients with cystic fibrosis. In a recent study at our centre here in Gothenburg we could not find this in any of the patients with our physiotherapy approach. One recent study by MacKelvie et al (2003) from Vancouver and Pennsylvania showed that three brief sessions (10-12 minutes) three times per week of weight-bearing exercises for 10 year old girls, resulted in a substantial bone mineral accrual advantage. The results suggest that an exercise program that begins in early puberty might result in greater peak bone mass compared with no training. Children with cystic fibrosis with trampoline jumping, as a part of the daily treatment will benefit from the weight bearing activity and increase bone mineral density and probably minimize the risk of osteoporosis.



From our positive experiences with trampolines, of the size mentioned, we strongly recommend the use of them in the regular treatment of children with cystic fibrosis.

1. Andreasson B, Jonsson B, Kornfält R, et al. Long term effects of physical exercise on working capacity and pulmonary function in cystic fibrosis. *Acta Paediatr Scand* 1987; 76:70-75
2. Blomquist M, Freyschuss U, Wiman L-G, et al. Physical activity and self-treatment in cystic fibrosis. *Arch Dis Child* 1986; 61:362-367
3. MacKelvie KJ, Khan KM, Petit MA et al. A school-based exercise intervention elicits substantial bone health benefits: a 2-year randomized controlled trial in girls. *Pediatr* 2003; 112:447-452
4. Orenstein DM, Henke KG, Cerny FJ. Exercise and cystic fibrosis. *Phys Sports Med* 1983; 11:57-63
5. Stanghelle JK, Hjeltnes N, Bangstad HJ, et al. Effect of daily short bouts of trampoline exercise during 8 weeks on the pulmonary function and the maximal oxygen uptake of children with cystic fibrosis. *Int J Sports Med* 1988; 9 Suppl 1:32-36
6. Zach M, Oberwaldner B, Häusler F. Cystic fibrosis: physiological exercise versus chest physiotherapy. *Arch Dis Child* 1982; 57:587-589