

Application of physiotherapy in persons at risk of metabolic syndrome development

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Abstract

Problems the locomotor activity and nutritional provisions in the treatment of obesity or metabolic syndrome are currently widely discussed. Based on prevailing experience, the attention in the field of locomotor and fitness activities is rather general, i.e. is mainly focused on the development of the general body fitness and reduction fitness programmes. However, no long-term effects of the locomotor therapy can be expected without appropriate and particularly targeted physiotherapy with a thorough kinesiological examination. Case report described here monitored the course of a three-month physiotherapeutic intervention in person having enhanced values of the waist circumference in accordance with criteria of the metabolic syndrome, who previously attended a programme of diet provisions without meeting with success. In this case, positive results of reductions in the waist circumference and further dimensions were achieved in spite of the fact that in the course of the physiotherapy no arrangements of nutritional habits have been introduced.

INTRODUCTION

Metabolic syndrome (MS) is a combination of disorders in the metabolism of blood saccharides and lipids, in the blood pressure control and in the deposition of lipids in the region of the abdomen and abdominal cavity. The most recent concerted definition of metabolic syndrome from 2009 is supported by a representative spectrum of international, American and European scientific associations (IDE, AHA, etc.). The diagnosis of metabolic syndrome is established, if three or more of the above mentioned criteria are present: Increased waist circumference, increased levels of triacylglycerol, reduced HDL cholesterol, increased blood pressure and enhanced fasting glycaemia (Grundy

SM *et al.* 2005). In accordance with national recommendations for the Czech population, the criteria of the increased waist circumference are of ≥ 88 cm for women and ≥ 102 cm for men (Coufalová 2011). Problems with maintaining the body weight involve the adult as well as children population and are considered as a pandemic of the 21st century by the World Health Organization (Rosolová 2012). More than the milliard persons suffer from the overweight or obesity worldwide; in the Czech Republic, the problem concerns almost two thirds of the adult population and 10–15% of children and adolescents (Kodl 2014). The worldwide increase in the occurrence of obesity, and particularly risks of metabolic syndrome, emphasized the importance of their prevention

and therapy in most countries in order that the public health might be improved (Kim *et al.* 2014). Questions of the locomotor activity and nutritional provisions in the treatment of obesity or metabolic syndrome is currently often discussed (Morales *et al.* 2016). Regular movement prevents the production of new adipose tissues and helps the patient to reduce it (Stránský & Ryšavá 2014). By increasing the locomotor activity, the increase in the general energy output is induced, the magnitude of the increase being dependent on the time period of the movement, on its intensity and on the type of the activity performed (Mourek *et al.* 2013). Based on prevailing experience, the attention in the field of locomotor and fitness activities is rather general, i.e. is mainly focused on the development of the general body fitness and reduction fitness programmes. Of course, no long-term effect of the locomotor therapy can be expected without appropriate and particularly targeted physiotherapy based on a thorough kinesiological examination.

Case report described below monitored the course of a three-month physiotherapeutic intervention in person having enhanced values of the waist circumference in accordance with criteria of the metabolic syndrome, who previously attended a programme of diet provisions without meeting success. A kinesiological analysis was provided in the course of each initial examination (Kolář 2009), which included anamnestic data, visual inspection, anthropometric data, examination by palpation and specific physiotherapeutic examination (Haladová & Nechvátalová 2010). The specific physiotherapeutic examination was an examination of the activity of the deep spinal stabilisation system (DSSS). After a period of 3 months, a final examination with adhering to the same methods as in the initial examination was implemented, and the physiotherapeutic plan success was evaluated.

CASE REPORT

A woman born in 1972, height of 166 cm

Anamnesis summarization

Problems with body weight encountered as soon as since the childhood. Not engaged in sports, body activity only within the framework of the school physical education. Currently recreational cyclist. Using hormonal contraception for about one year (no associated body weight increments). Mother rather with underweight all her life, overweight occurred after 60 years of age only. Father with overweight all his life, but without weight oscillations. Children having ideal weights. Occupation: University pedagogue, rather sedentary in nature. Movement only within the framework of transfers to city mass transportation station and within the area of the faculty. Taking meals at least three times daily but also trying more frequently. Breakfast at about 8–9 a.m. and last meals at last 2 hours before sleeping.

Intervals between meals are regular: 2.5 – 3 hours. She tried to take a reduction diet based on decreasing calories ingested – unsuccessfully. Not preferring particular type of foods, eating everything. Not using alcohol, not smoking and not suffering from other dependence on addictive substances.

Course of therapy

In accordance with a plan, the therapy twice a month for a period of 3 months was expected, but one lesson was omitted due to a proband's disease.

Lesson 1: In the first lesson, the initial examination was carried out. The patient was instructed about the stretching exercise. Four condition exercises were explained – 1. Lifting back part of the body from a support lying in the supine position with expiration (persistence for 30 s), 2. Extending the superior lower extremity with knee upward, lying on side (10 times on each side), 3. Moderate squats, standing with retracted abdomen (15 times), 4. Alternating lifting of upper and contralateral lower extremities in the kneeling position with palm support (persistence for 30 s on each side).

Lesson 2: At the beginning of the second lesson, the following relieving manual techniques in the regions of the thoracic spine and lumbar spine were performed. Continuation by training the participation of the diaphragm in breathing. Training of this method of breathing to be performed at home at least twice a day, always for a period of time of 5 min. The subsequent control of correct performance of the condition training with adding four further condition exercises – 5. Alternating stretching of lower extremities lying in the supine position with knees bent above the support (10 times for each lower extremity), 6. Slow changing the position to sitting from the supine position with upper extremities along the body (10 times), 7. "Cycling" above the support lying in the supine position (30 s), 8. Slow oblique changing the position to sitting, lying in the supine position, always toward one of lower extremities (10 times toward each side).

Lesson 3: The lesson was cancelled because of a proband's disease.

Lesson 4: Relieving manual techniques were implemented in the thoracic spine and lumbar spine regions and the way of performing the condition exercise was controlled. Training of breathing at an elevated intraabdominal pressure with the instruction: to be carried out twice a day for two min.

Lesson 5: The following relieving manual techniques in the regions of the thoracic spine and lumbar spine were performed. Increasing the load in the existing condition exercise. Persistence in exercises 1 and 7 was increased to 1 min, exercise 2 to be repeated 20 times on each side, exercises 3, 5 and 6 to be repeated 20 times, exercise 4 to be kept for 1 min per each exchange of extremities and exercise 8 to be performed 20 times on each side. The training of the deep spine stabilization system activation was made more difficult by support-

ing calves in such a way that the lower extremities were bent at the right angle and the proband stepwise alternately lifted the extremities. Further increase it in the load was implemented by simultaneous lifting of both lower extremities with keeping this position for a while.

Lesson 6: In the course of the last session, the output examination was implemented. The proband was instructed about further possible exercises within the framework of the fitness training and about the suitability to continue performing the exercise for the activation of the deep stabilization system of the spine.

Therapy evaluation

For the whole period of the therapy, the proband did not lose her motivation, the motivation was even increasing. The condition of the deep spine stabilization system has been improved. The proband practised fitness training and in addition, she attended a recondition training two to three times a week and performed aerobic training there. She replaced the use of the city mass transportation system by cycling. After completing the therapy, the proband has feelings of enhanced vitality and energy. She realized the enhancement of her physical condition and reduced fatigue. She feels stronger, more resistant and more stable. She enjoys the fact that the therapy brought its effects. The weight decrement is of 5 kg, which is manifested by reducing the size of clothing from number 46 to number 44. The waist circumference was reduced by 3 cm, but the most considerable effect is a reduction in the amount of the adipose tissue in the region of thighs. Since the therapy was shown to be effective and acceptable, she was recommended to try reducing the body weight from the area of obesity at least to the area of overweight. Further possibilities of the aerobic exercise were recommended, such as swimming, Nordic walking or tourism. Given

the fact that the proband works in an office and is sitting for the whole working time, she was provided with instructions about appropriate dynamic sitting during the work.

DISCUSSION

Metabolic syndrome is not any new disease, but presents an important warning as to the risk cardiometabolic profile of the patient (Hainer 2011). Common biochemical tests and the measurement of the abdomen circumference are sufficient to establish the metabolic syndrome circumference (Svačina 2013). Further methods of determining the adipose tissue, for example the measurement of skin plicae by using a calliper, are sometimes affected by subjective errors. Possible imprecisions can also occur in frequently employed and medially presented BMI calculations. The index does not take into account proportions of the adipose and muscle tissues participating in the total body weight of man (Poděbradská 2011). Due to this, even a body builder having a low percentage of the body fat can be considered as obese.

In the treatment of all the metabolic syndrome components, the medication or possibly bariatric/metabolic surgery with adjusted diet provisions are sometimes overestimated. The contemporary modern society is prone to these concepts, but the proposed "simple" solutions seldom lead to the result desired. For effective and particularly sustainable solutions to these problems, adjustments of fitness and locomotor activities of man are essential. Not only the decrease in the body weight, but also the improvement in the health condition and restriction to the risk of the complication and contrastingly also reduction in the medication for already developed diseases are concerned (Tsigos *et al.* 2008).

Tab. 1. Anthropometric and further data from the initial and final examinations.

	Initial examination		Final examination	
Weight (in kg)	94		89	
BMI	34.11		32.29	
WHR index	0.93		0.90	
Waist circumference at the umbilical level (cm)	112		109	
Sides circumference at trochanter level (cm)	122		121	
Chest size (cm)	112		112	
Arm circumference (cm)	42 (right)	42 (left)	40 (right)	39 (left)
Forearm circumference (cm)	30 (right)	29 (left)	29 (right)	29 (left)
Thigh circumference, 15 cm above patella (cm)	65 (right)	66 (left)	60 (right)	63 (left)
Calf circumference (cm)	47 (right)	46 (left)	46 (right)	45 (left)
Skin fold on cheek (mm)	24		20	
Skin fold on double chin (mm)	26		24	
Skin fold on back under scapula (mm)	44		40	

The present contribution documents the fact that the adjustment of movement habits is very effective in the metabolic syndrome therapy. However, it is to emphasize the fact that the recommendation of “more movement” or possibly participation in most diverse fitness programmes is not sufficient in general. For reaching a long-term therapeutic effect, a specifically targeted physiotherapeutic examination and individual compilation of the physiotherapeutic plan are needed.

The effect of each therapy depends on the time period of its duration and on its intensity (Janura *et al.* 2015). From the case report presented here, it is obvious that the period of 3 months is sufficient for supporting the efficacy of the physiotherapeutic plan designed, but for achieving an optimum condition, a longer period of time would be necessary, which is individual for each particular person. In any fitness activities, it is of course also necessary to point out their important contribution to the general health condition of the particular person regardless of the resulting decrease in his/her body weight (Lakhdar *et al.* 2014). It is also quite obvious that introducing changes in diet habits results in a reduction in the body weight, but is not the most important tool in the obesity or metabolic syndrome therapy. In our proband, in the course of the therapy, there was neither any change in the nutritional habits nor any diet provision, and in spite of this, the reduction in the waist circumference was achieved. Our results are thus different from opinions by Svačina that the diet is the most important provision in the weight reduction (Svačina & Bretšnajdrová 2008). His opinion is also supported by many other authors and thus, we believe that for the successful long-term treatment of metabolic syndrome, it is necessary to combine the enhanced physical activity with changes in the nutrition. European recommendations for the treatment of obesity in adults are also in agreement with this concept. In addition to these changes, they also recommend cognitively behavioural techniques for changes in thinking or for a psychological support aimed at managing secondary complications (stress, anxiety, depressions). However, in the description of the physiotherapeutic intervention, we encountered a much larger problem than the metabolic syndrome treatment, which is its prevention. Many persons are rather uninterested in their body weight or do not know how to solve the problem. These people most frequently depend on information from media and internet. If one suffers from the overweight only without feeling any associated problems, then he/she is not motivated to call a physician and request a help. The increased weight is then solved only marginally after a development of a more severe disease. That is why we believe that more interest should be paid to the increased weight and further parameters as soon as in the consulting room of a practitioner, who could propose further suitable procedures. Preventive movement programmes are still also low in number in the society and any public information is very desirable. Invest-

ments in qualified physiotherapists, specialists in clinical practice dealing with systemic solution of problems in patients at risk of metabolic syndrome, are also recommended in numerous foreign studies (Vancampfort *et al.* 2016).

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