Abstract
Lifestyle with regular physical activity provides substantial health beneficial effects. Potential specific benefits of regular physical activity include increased strength and endurance, improvement of flexibility and a sense of health and a better quality of life. Physical activity programme should be designed according to the determined goals. The preparation of a physical activity programme that will be applied throughout life requires knowledge of individual physical ability. An initial evaluation of health status is particularly important in individuals who have a positive family history data on cases of early mortality due to insulin dependent diabetes or cardiovascular diseases. It is equally important to make a serious assessment of health status in individuals who lead sedentary lives. In overweight individuals it is useful to determine the percentage of body fat. Programming physical activity and its timely application in terms of prevention and treatment, represents the key element in the treatment of cardiovascular diseases, diabetes and obesity, as well as active independent means of reducing pain and increasing capacity during pregnancy and aging process.

Key words: EXERCISE / OSTEOPOROSIS / DIABETES MELLITUS / OBESITY / CARDIOVASCULAR DISEASES / PAIN THERAPY

INTRODUCTION

Sport is any activity or exercise that gives enjoyment or recreation. Individuals participate in sports activities for different reasons and at different levels of sports competitions. Motivation for success can be very different in recreational and professional participants in sport. However, the potential benefits of participating in sports activities greatly exceed the direct result like a victory in the competition. Regardless of the level of participation, preserving and improving health can be an important component of engaging in sports activities.

The component of physical activity that exists in most sports is especially important for the prevention of disease and disability. Lifestyle with regular physical activity provides substantial health beneficial effects. Potential specific benefits of regular physical activity include increased strength and endurance, improve flexibility and a sense of health
and a better quality of life. Regular physical activity can reduce hypertension, improve functional ability of the cardiovascular system, reduce the percentage of body fat and improve lipid levels.

Lifestyle with regular physical activity helps prevent cardiovascular disease, osteoporosis and many other pathological conditions (Mujović, 2010). Physical activity can also help in slowing the progression of diseases such as diabetes and hypertension. It can also reduce the disability that accompanies many of these diseases.

Physical activity may be especially important for people with health impairments caused by disease or trauma. It can prevent the occurrence of secondary complications of the disease or conditions which caused health damage. Physical activity can help in improving the remaining functions.

**EXERCISE PROGRAMME OBJECTIVES**

In an attempt to redefine his or her lifestyle and to include sports activities, one must first define the goals of his programme. Physical activity can cause many beneficial effects including improvement of the functional capacity of the cardiovascular system, decreasing the percentage of fat in body structure, strength increase, endurance improvement and greater flexibility. Regular physical activity can lead to the improvement of tolerance to elevated ambient temperature conditions and can help in reducing the effects of everyday stress.

Physical activity programme should be designed according to the determined goals. For example, a programme that improves cardiovascular endurance is quite different from the one that improves muscle strength. Reducing the percentage of body fat also requires a separate programme. The enthusiasts are usually interested in multiple positive results. Appropriate multifaceted programme can achieve these goals (Stojiljković et al., 2010). Such programme should be continuously monitored to ensure that none of the objectives during the implementation of the multifaceted programme is neglected.

**CREATION OF PHYSICAL ACTIVITY PROGRAMME WHICH WOULD BE APPLIED IN LIFE**

Physiologists, physiatrists and coaches are the only ones qualified to assist athletes in gaining fitness by means of regular exercise. Knowledge regarding the anatomy and physiology of bones and muscles, health beneficial effects of physical activity and other modalities, allow the team of experts to create an appropriate programme of physical activity. “Prescribing” physical activity is similar to prescribing medicine: both should be adapted to specific needs of an individual. The factors that should be taken into account are the health status of an individual, his or her lifestyle, family medical history and personal interest in sports.

The creation of physical activity programme that will be applied throughout life requires knowledge of the individual physical abilities. It is more likely that the participants of the programme will accept the physical activity programme that takes into account individual physical abilities and interests. Activities that require explosiveness such as cricket (basketball) and handball may not be suitable for individuals with poor posture and deformities. An individual who has a medical problem needs an adapted physical activity programme that takes into account his limitations, especially if they follow the development of a disease.

Potential benefit of physical activity may be negated by a wrong choice of exercise programme and by not providing adequate protection. For example, the “weekend” athletes of middle age, very often have musculoskeletal injuries because they only occasionally, at weekends, physically exhaust themselves, and do not apply the programme of stretching before physical activity. Such activities during adolescence are not likely to lead to injuries.
EVALUATION OF HEALTH CONDITION AT THE BEGINNING OF PHYSICAL ACTIVITY PROGRAMME

An initial evaluation of health status is particularly important in individuals who have a positive family history data on cases of early mortality due to insulin dependent diabetes or cardiovascular diseases. Testing on treadmill is particularly important to estimate cardiovascular function, especially before starting the exercise programme that would burden the cardiovascular system. A person who has a personal history of coronary disease will probably have to go through a wider range of diagnostic tests before commencing the programme of intense physical activity. In order to create the appropriate and health-safest physical activity programme, it is necessary to consult a cardiologist.

It is equally important to make a serious assessment of health status in individuals who lead sedentary lives. Injuries of bones and muscles can limit physical activity for people in poor shape. Muscles that connect two joints are particularly prone to injuries. In overweight individuals it is useful to determine the percentage of body fat. The most accurate measurement of it is the underwater one, in order to determine the percentage of body fat, but also caliper measurements can give a satisfying evaluation (Jović, Perunović, & Radivojević, 1982). Obese patients may benefit from physical activity which improves cardiovascular function, endurance and changes body composition even if there are no significant changes in body mass. Special programmes of long-term exercise of endurance type (for longer than it is necessary to achieve positive effects on cardiovascular system) are required in order to achieve significant weight loss.

OSTEOPOROSIS

Osteoporosis is a frequent pathological condition in older persons, especially women. Until their nineties, 32% of women and 17% of men will experience a hip fracture conditioned by osteoporosis. During the year after the fracture 12-20% of them will die.

In young people, bone maturation continues even after the cessation of long bones growth. Maximum bone mass is achieved around the third decade of life. If physical activity is applied prior to reaching the maximum, it helps build bone mass and may reduce or delay the occurrence of osteoporosis and its secondary complications. The degree of exercise is an important factor in achieving peak bone mass and maintaining bone mass and skeletal integrity. However, physical activity can not completely eliminate or prevent the association of osteoporosis with aging and changes in hormonal status (Mujović, & Ivanović, 2009; Mujović, Marić-Dorđević, Đukanović, & Jovanović, 2009; Đukanović, Jakovljević, & Mujović, 2009).

Exercise programme that aims at preventing the occurrence of osteoporosis must be designed according to individual needs and limitations. It seems that physical activity is particularly useful for the formation and increase of bone mass in which “load is weight.” In order to prevent osteoporosis, sports medicine physicians should recommend activities such as walking and tennis.

While physical activity is, in general, useful for the prevention of osteoporosis, inadequate (excessive) physical activity of young women can be harmful. These women may experience amenorrhea and reduced levels of estrogen in blood which in turn leads to decreased absorption of calcium and reduced bone mass. Women who have a hormonal disorder caused by physical activity should be aware of these potential hazards.

DIABETES MELLITUS

In patients with type II diabetes, physical activity reduces the need for insulin in glucose metabolism because it leads to increased sensitivity of skeletal muscle and adipose tissue to insulin, during and after physical activity. In this way, regular physical activity can reduce the amount of oral hypoglycaemic or insulin in patients with type II diabetes. It appears that regular physical activity reduces the incidence or at least postpones the occurrence of diabetes mellitus type II.
In patients with type I diabetes physical activity reduces the need for insulin due to increased usability of energy reserves. When starting the programme of physical activity, in the condition of both diabetes type I and type II, doctors and participants in sports (patients) should carefully monitor the level of glucose in serum. Monitoring allows determining the level of hypoglycaemia created by increasing physical activity so that the dose of medication can be adapted to the existing needs. For people who take insulin or oral hypoglycaemic agents, hypoglycaemia may occur during physical activity or immediately after. Physical activity in the afternoon or evening is particularly problematic because of the risk of hypoglycaemia during the night.

Intense physical activity in diabetics can cause the symptoms of undiagnosed cardiac pathology. The effects may include angina pectoris, arrhythmia and ischemic heart disease.

Physical activity that is practiced throughout life can reduce the complications of diabetes (later in life), especially on the cardiovascular system. Maintaining body weight close to the value of lean body mass reduces the impact of diabetes on different organ systems. The recommended exercises are of endurance type applied at least 30 minutes three times a week, with the intensity of 50-70% of maximum aerobic capacity.

In diabetics with nephropathy, excessive increase in physical stress predisposes proteinuria. Therefore, they are recommended a programme of moderate physical activity.

OBESITY

Obesity is best treated by combining the appropriate programme of physical activity and weight loss diets. The optimal goal of prevention or treatment of obesity should be to reduce the percentage of body fat and consequent increase in lean body mass. Short-term diets are often used for weight loss, but are generally insufficient to achieve long-term reduction of obesity. After the diet terminates a “rebound” phenomenon (reverse effect) often appears, which can make every next diet more difficult (Mujović, 2007c). It seems that during dieting the organism is trying to keep the size of fat cells. In order to prevent the loss of body fat, the so called “homeostatic points” are placed. In the attempt to preserve the (abnormal) body weight, they decrease basal metabolic rate. Physical activity can help in moving these “points”.

Many individuals try to reduce body weight by exercising for a short period of time, with the intensity which is close to the maximum aerobic capacity. This type of exercise exhausts the carbohydrate reserves (they are later recovered) and is not the most effective way to reduce the percentage of body fat. Much more effective for burning fat is a moderate level of physical activity, with about 60-70% of maximum aerobic capacity, which is practiced 60 minutes a day (Mujović, 2004b). Regular physical activity helps to improve the relation of lipids in serum (lipid status).

Physical activity leads to a reduction in triglycerides and very low density lipoprotein (VLDL) and increases high density lipoprotein (HDL).

During the programme of physical activity to reduce obesity, it must be understood that many obese patients try to underestimate their caloric intake and overestimate their physical activity (e.g. CIGOTA, Zlatibor).

CARDIOVASCULAR DISEASES

For people with a family history of early occurrence of cardiovascular diseases, regular physical activity is of particular importance to reduce the risk of cardiovascular diseases and stroke. Commitment to physical activity throughout life is particularly important. Exercise must maintain aerobic endurance at least 60-70% of maximum aerobic capacity (Mujović, 2004c). Occasional strain caused by, for example, playing tennis in mixed doubles, is not as efficient as the programme of fast walking or swimming.

From the cardiovascular standpoint, regular physical activity is beneficial for many reasons. Improved function of the heart muscle leads to a decrease in resting heart rate, increase in maximum cardiac output, increase in maximum oxygen consumption and reduced heart rate for a given level of activity. As mentioned earlier, regular physical activity improves serum lipid profile. Regular physical activity may also reduce mild and moderate hyper-
tension. The antihypertensive effect of exercise is independent from weight loss or changes in body composition (Mujović, Jovanović, Kojić, & Đukanović, 2011; Mujović, 2011).

The level of physical activity needed to improve cardiovascular form is based on the determination of individual values of maximum aerobic capacity. Target level of physical activity should increase the values of heart rate to 60-80% of predicted or measured maximum heart rate. Examples of formulas for determining maximum heart rate are given below (Mujović, & Jakovljević, 2010; Mujović, 2007):

Men: maximum heart rate = 206 - 0.80 x age.

Women: maximum heart rate = 198 - 0.63 x age.

PAIN THERAPY

Physical activity often causes musculoskeletal pain that is usually transient. Because of this, individuals with chronic pain often avoid physical activity, embracing the philosophy: “Do not do it if it’s painful.”

Physical activity is a stimulant that improves strength and fitness necessary to avoid injuries. An individual who has a significant weakness of the chest that is vital for weightlifting has also an increased incidence of injury. Even a person with low cardiovascular fitness has increased incidence of disability associated with back pain. In many studies it was shown that people with chronic pain in lower back extensors are weakened spine and altered muscle strength and endurance. Neck flexor strength was also decreased in patients with chronic neck pain (Mujović, 2003; Mujović, & Bukara, 2010; Mujović, 2004a).

Physical activity is the most effective individual tool for reducing pain and increasing functional capacity. It is usually an important part of chronic pain treatment. Provided that medical condition is essentially stable, physical activity can lead to improvements in physiological function of affected body parts. An important component of therapeutic programme for people with pain in the lower back is to increase the strength of paraspinal and abdominal muscles, increase endurance and improve coordination. Equally important is to improve the flexibility of the spine. However, most important is the potential benefit of general physical fitness. Physical activity can also help people who suffer from chronic pain syndrome to reduce the effects of everyday stress, and can help in modelling central paths of pain by releasing endogenous opiates (Mujović, 2006). Physical activity and improvement of fitness also help in improving self-confidence in athletes with pain.

The preparation of physical activity programme for the purpose of pain therapy can be challenging, especially because the athlete is motivated to quickly improve his functional status. Other physical therapy and medications can help the athlete to effectively perform the prescribed exercise programme. The programme of physical activity must be individual. Factors to consider include: posture, specific sources of pain, overall condition of the skeletal muscle system, stability of the health of an athlete, basic cardiovascular status and the level of motivation for improving functional status. Most commonly it starts with exercises that increase flexibility in the painful area. Exercises for endurance and strengthening are gradually added. Physical activity that leads to improved fitness condition should be part of every therapeutic programme for athletes with pain.

PHYSICAL ACTIVITY AND PREGNANCY

Physical activity is an important component of the programme for preserving health during pregnancy. Ideally, the programme should begin before conception (Mujović, 2007a). Exercise during pregnancy is useful for increasing and maintaining muscle strength and flexibility. Exercises for the stabilization of the spine may help in reducing back pain, which is associated with weight gain and moving the centre of gravity during pregnancy. During pregnancy, the target heart rate during exercise should be about 25% lower than for the general population (not to exceed 140 beats per minute). In this condition, what is usually recommended is walking, swimming and aerobic physical activity of low intensity (Mujović, 2007a).

Particularly useful is physical activity for pregnant women suffering from pregnancy-induced diabetes (gestational diabetes), because it increases
the sensitivity of insulin receptors. It can be a useful addition to the prevention or reduction of excess body weight. Physical activity during pregnancy can help in reducing hypertension and hyperlipidemia caused by pregnancy.

PHYSICAL FITNESS
AND THE AGING PROCESS

The aging process causes many physiological effects that are associated with a decrease in functions, but maintenance of physical fitness can delay or reduce these effects (Kaptein, Gignac & Badely 2009; Cress et al, 2005). Typically, muscle mass decreases by 30% between the age of 30-70 years (Mujović, 2007c). After the age of 70 it comes to further atrophy of muscle fibres, which principally affects type II muscle fibres (Mujović, 2007b). The functions of the heart and lungs are also reduced with age, which results in permanent decrease in aerobic capacity and maximum working capacity. The percentage of body fat increases and is accompanied by corresponding reductions in lean body mass (Mujović, 2007d).

Regular physical activity throughout life can slow down the changes, and may even improve muscle function (Nemcek, et al., 2011; Tekur, Negendra, & Raghuram 2008; Bates et al. 2009). In addition, physical activity of older people, even those with a previously sedentary lifestyle, can improve physical fitness and general health. Regular physical activity can help reduce heart rate at rest, and systolic and diastolic blood pressure (Živković, Jakovljević, & Mujović, 2002). Aerobic capacity and maximum cardiac output rate can be significantly improved in older people, especially those who were previously sedentary.

Changes in walking are common components of disability (invalidity) in older people and often limit functional mobility. Normal walking depends on the coordination and integral function of neuromuscular, cardiopulmonary and skeletal systems. Injury or illness can affect normal walking, and since these states are more common in older people, walking abnormalities are more common. To some extent this may be prevented by regular physical activity throughout life, which includes the exercise of strength, flexibility and coordination.

Falls are a common problem in older persons. Between 20-30% of people over 65 years old who live in cities, have at least one fall per year; half of them have more falls. Changes in walking and balance contribute to falls. Low muscle strength is also an important factor, especially in the major muscle groups of the lower extremities. Walking is an effective condition stimulus in older persons and can prevent the loss of strength leading to falls. Appropriate physical activity for most healthy individuals over 60 years is walking at a speed of 5-6 km/h, 40-60 minutes several times a week. This would be the ultimate goal of physical activity programme for those who have led sedentary lives. Physical activity can increase muscle strength in older persons.

CONCLUSION

In today’s modern times we have witnessed a large increase in the number of patients with chronic non-infectious diseases. Certainly one of the key factors responsible for this state is sedentary lifestyle with insufficient level of physical activity. In order for dosed activity to really become a powerful weapon in the fight against the disease of modern society we need continuous education of all factors who are actively involved in the implementation of the prevention and therapy programme. For long-term preservation of health and optimal dosing of physical activity, it is necessary to implement the latest achievements in molecular biology, which, at the service of medicine, can be an indispensable tool in the therapeutic-preventive dosing of physical activity.
REFERENCES


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