

Zefi Gjudio,
Msc. in Physical Education,
the Faculty of Educational Sciences
University of Shkodra
E-mail: giuliozefi@yahoo.it

THE EFFECTS OF ELECTRICAL MUSCLE STIMULATION TRAINING (EMS) ON IMPROVING POSTURAL PARAMETERS IN MIDDLE AGE (50–60 YEARS)

Abstract: This study illustrates how the methods of training with electrostimulation work and what are its effects on health and on physical and physiological parameters. EMS is a healthy method that accelerates metabolism, increases strength and endurance, reduces back pain, tones and removes excess kilograms. Everything is parallel to the diet. The results are different and this depends on the metabolism of each of the operators: rehabilitation purposes (post-operative muscle development); improvement of back pain; local muscle development (for athletes).

Keyword:

Introduction

How does EMS training works?

When we talk about EMS training we refer to a training integrated with the muscle stimulation technology that has long been used in the field of rehabilitation medicine. The electrical impulse generated by the WB-EMS device replaces the normal electrical impulse of the muscle that the central nervous system sends to the muscle to contract it. EMS training in this way reacts directly to the nerve that connects the muscle to the central nervous system causing contraction.

The best results are achieved when active exercises are combined with electrical stimulation: each exercise, which leads to muscle contraction, will also stimulate a corresponding elective impulse from the outside. The muscle will thus experience a further increase in tension, an optimal presence and a recruitment of its fibers, with even more effective stimulation.

During EMS training, approximately all the motor units are activated synchronously. This means that at the same time, during which only some of the few muscle groups could be trained so far, it is now possible to complete a full body exercise. Working with the training parameters and choosing the appropriate exercises, you can achieve the desired results, from muscle tone to weight loss, increased metabolism and improved sports performance.

To improve the potential of sports results, so-called “self-aware” load limits must be applied during training. These stimulations are created on the basis of a common load and interfere with the biological balance. For this reason, loading and relaxation should be planned as a unit, relaxation should work in proportion to the intensity and volume of the exercise. The training sessions can be up to two a week with a duration of 20 minutes each. The period of rest between them should be at least 72 hours, which will allow the body to recover and

eliminate the unnecessary substances that are created during training.

When we can use the EMS training?

This type of training is very effective in the case of muscular imbalances to be compensated if the back pain must be alleviated when the pelvic floor muscles have to be tightened and the blood circulation must be encouraged. During high performance sports, EMS Training is used to achieve optimal excitation of training in terms of muscle guidance:

1. EMS is used for amateur and professional sportsmen. The combination of EMS with active exercises leads to new levels of resistance and performance. Electrostimulation allows greater muscle contraction and increases strength in the speed range. Individual training procedures that activate a large number of muscles have an optimal influence on developmental abilities such as endurance, maximum strength, explosive strength and muscle development.

2. For rehabilitation needs after a short or long period of rest for health or traumatic reasons [1, 88–93].

3. For those who want to lose weight and increase metabolism while maintaining a good muscle tone.

Advantages of the use of electrostimulation technique

- Influences the conservation of the locomotor system from damage: the EMS exercise is an exercise “without extra loads”. The intensity of the exercise during the EMS is created not through heavy weights, but through electrostimulation. And this aspect is the most protective for the wrists and for the locomotor apparatus. During EMS training, exercise intentions are produced by electrostimulation. As a result, you can perform a workout that protects your wrists and does not use extra loads through weights;

- Compensation for muscular imbalances: EMS allows the targeting of muscle groups. This is especially important if

the muscle differences are compensated. Here we talk about all those people who make a sedentary life because of the profession [2; 8];

- The effects of muscle stimulation on power capacity: through EMS it is possible to produce a stronger muscular contraction than when the energy develops voluntarily. Moreover, the rapid stimulation of the muscle fibers and fast muscles of the trunk will be visible;

- Maximum power and endurance affects: inexperienced people are able to voluntarily control only 40–70% of their energy potential. EMS reduces this energy deficit between maximum and absolute energy. This is because, through EMS, the motor units are able to synchronize and take better action. Furthermore, resistance increases through EMS in a visible and verifiable manner;

- Electrostimulation has a good effect on muscle development (hypertrophy): the maximum increases already mentioned through EMS are substantially attributed to the increase in muscle mass. The enlargement of the thorax, upper and lower limbs is visible. Often, these effects of muscle response are observed a few days after the training units;

- Compensation for muscular imbalances, better attitude, less backache: the imbalance of the musculature of the vertebral column, abdomen and pelvic floor is a permanent postural problem. Through EMS, these muscle groups can be directed and trained effectively, especially during imbalance and when there is pain in the spinal cord, the results are very evident and after a short time. In a study by Bayeruth University, it was concluded that EMS Training is a good way to reduce back pain and increase strength in the same way or in a better way than usual strength training [3]. At the same time, the correct compensatory positions are corrected, an aspect that further improves attitude and mobility;

- EMS influences muscle development after surgery: various studies have shown that through EMS, muscle retraining after an operation can be effectively accelerated. Especially when used during the acute phase, shortly after surgery;

- There is efficiency in increasing sports performance: Resistance has low returns in many types of sports. EMS is offered, when it is intended to improve specific endurance to sport, improves the quality of muscle constituents and serves to balance imbalances. Complementately, EMS is offered through numerous types of technical and specific training as an alternative, which saves time, compared to traditional training [4];

- Electro-stimulation training programs help reduce weight and subcutaneous fat: the EMS promotes a continuous reduction of body weight and body fat. High metabolic activity, during and up to several hours after EMS training, causes a high volume of work. The continued development

of fat-free muscle mass causes a significant increase in basal metabolic rate. In women, a reduction in fat mass obtained through EMS can be found, mainly in the problem areas: the waist, hip and thigh and at the same time the tension in the chest and wrist. Furthermore, in men, EMS leads to voluminous contractions of life, the enlargement of the chest, the arms and the lowering of the perimeter of life. There is a slight and constant increase in the musculature of the legs and buttocks.

Both men and women generally have a 5–9% reduction in fat mass, which is more evident in males because muscle mass tends to grow more than women for genetic and hormonal reasons. This was noted in a study at the University College of Nyíregyháza (Hungary), where it was found that after 16–18 sessions of EMS the muscles and fat mass had changed significantly. Specifically, the subjects involved in the study had an average waist circumference reduction of 4–6% while muscle mass values increased by 30–50% [5]:

- It affects the protection of the joints, since with the EMS we do not use barbells and weights: time is saved, as in a year you can save on average 300 time and effort;

- Regulates muscle tension: improves the relationship of muscle tension given that the energy transmitted to each muscle is the same and in traditional exercise is impossible. During the exercise, adrenaline is released at a high level. After 20 minutes of exercise the high level of stress improves significantly [6, 75–81];

- Professional sportspeople in 12 sessions x 20 minutes can improve explosive strength, speed and endurance by 20–30%. Untrained individuals can improve 40–100% of strength, speed and endurance.

It should be kept in mind that, as in all types of training, either for competitive or amateur goals, even for EMS Training it is mandatory to have a medical certificate.

All people who use the pacemaker, have circulatory problems, cardiac arrhythmia, kidney problems, abdominal or inguinal hernia, tumor, atherosclerosis, diabetes mellitus, neurological diseases, bacteriological or viral diseases, hemophilia, plastic operations should consult with a specialist doctor who will be able to use EMS Training.

Materials and Methods

18 people in the 45–55 age group were taken for the study, 9 women and 9 males, who attended a gym (Body Code) and a group of 18 people of the same age group (9f + 9m) as a control group. The study was done for a period of 12 months with a frequency in the gym of 1 time a week with 20 min of training. Data were recorded before starting the program and at the end of the period mentioned above. Comparative analysis revealed significant changes in all physical and physiological parameters.

Results

After 12 months, significant changes in overall muscle mass were observed for the EMS group ($0.6 \pm 2.2\%$) compared to the control group ($-0.6 \pm 1.9\%$) ($p = 0.025$) and abdominal fat mass for the EMS group ($-1.0\% \pm 4.8\%$) compared to the control group ($2.3\% \pm 5.6\%$) ($p = 0.038$).

In addition, the muscle mass of the upper leg varied in favor of the EMS group ($0.6\% \pm 2.3\%$) compared to the control group ($-0.9\% \pm 1.8\%$) ($p = 0.033$), while the effects on the fat mass of this part of the body were within the limits ($-0.7\% \pm 3.3\%$) for the EMS group compared to the control group ($1.1\% \pm 2.5\%$) ($p = 0.050$).

In terms of functional parameters, the effects on the thrust force of the feet were distinct in favor of the EMS group ($9.2\% \pm 10.9\%$) compared to the control group ($1.2\% \pm 7.9\%$) ($p = 0.010$).

Conclusions

Analyzing the results obtained from the case study described above, we come to some conclusions that show that the use of EMS training in the case group for a duration of 12 months with a weekly session of 20 minutes has had positive and very visible effects in compared to the control group. Significant changes have been observed in the change in overall muscle mass, but also in the change in abdominal fat mass. Important for the age group was the result obtained in the thrust force that was very distinct in the case group compared to the control group.

In conclusion, the use of EMS training in the 50–60 age group should be customized on demand and is highly effective in improving the appearance of fitness.

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