13-15 December 2019
İstanbul/TURKEY

JOURNAL OF ATHLETIC PERFORMANCE AND NUTRITION

VOLUME 6 – SUPPL. 1.
DECEMBER-2019

BOOK OF ABSTRACTS AND FULL TEXT

II. ICMFCE
INTERNATIONAL CONFERENCE ON MEDICAL FITNESS AND CORRECTIVE EXERCISE

www.medfitcorrex.com

Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

This journal is *PEER REVIEWED* and is indexed in: Index Copernicus, Google Scholar, Crossref, DRJI.

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INVITED SPEAKERS

TACKLING OBESITY THROUGH HYBRID INTERVAL TRAINING

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Introduction

More than half the worldwide population is struggling to lose weight and meet the recommendations for physical activity. On the other side, the global health and fitness industry is on the rise through new trends and workout routines focused on fundamental movement patterns in a small-group training setting. Latest research findings suggest that high-intensity circuit integrated neuromuscular training can be an effective, safe, time-efficient and enjoyable approach to improving body composition, performance, health and quality of life in sedentary adults affected by obesity. In this workshop, a research-based hybrid interval training program will be presented linking theory and practice.

Summary

This workshop is based on a 10-month randomized controlled trial that examined body mass, body composition, energy balance, physical performance and psychological responses of previously sedentary overweight/obese women to a high-intensity, circuit-type integrated neuromuscular training program with alternative modalities. In weeks 1-20, two training groups trained three times/week using 10-12 whole-body exercises of progressively increased intensity/volume, organized in timed interval circuit form. In weeks 21-40, one training group continued training whereas the other group not (detraining). Training reduced body mass (-6%), body fat (~5.5%) and increased fat-free mass (+1.2-3.4%), strength (+27.2%) and endurance (+26.8%) after a 10-month implementation period using a metabolic overload of only 5-12 metabolic equivalents of task-hours per week. Training induced a long-term negative energy balance during an exercise and a non-exercise day due to an elevation of resting metabolic rate (6%-10%) and exercise-related energy expenditure. Training had an 8% and 94% attrition and attendance rates, respectively. Additionally, the 10-month training reduced psychological

distress (72%), external regulation (75%) and increased vitality (53%), introjected regulation (63%), intrinsic regulation (33%), and identified regulation (88%). Training-induced gains were attenuated but not lost following a 5-month detraining.

PubMed Articles:

https://www.ncbi.nlm.nih.gov/pubmed/30138475

https://www.ncbi.nlm.nih.gov/pubmed/31193901

https://www.ncbi.nlm.nih.gov/pubmed/31478436

Purpose

The translation of science into practical application regarding the effectiveness of a high-intensity circuit integrated neuromuscular training program on body composition, performance, health, behavior regulation in exercise and vitality in sedentary adults suffering from obesity.

Objectives

a. Meet the latest research demonstrating that exercise intervention programs with a hybrid structure based on functional fitness and interval training can be an effective way to train for weight loss.

b. Understand how to design and execute a novel exercise programming relating the current worldwide top trends in the fitness industry with a focus on beginner clients with overweight or obesity.

c. Design, modify and instruct creative, time-effective and progressive integrated neuromuscular training routines from the lab to the gym for a variety of client abilities and fitness levels.

Take away points

a. Numerous evidence-based protocols for hybrid interval training focused on inactive overweight clients through innovative and customized small-group training solutions.

b. Proven practical ideas to design progressive circuit-type, integrated neuromuscular training programs that improve all fitness components in previously untrained adults with overweight or obesity.

c. Coaching expertise and skills about safe and efficient exercise programming combining the top fitness trends in the fight against obesity epidemic.

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SPECIFIC DOPING IN VOLLEYBALL

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Introduction

There have been cases of doping in volleyball players with steroid anabolics, erythropoietin and analgesics (VolleyMob Anti-Doping, 2019). The investigation of the factors that predispose to doping in elite athletes has shown (Sekulic et al, 2016):

-a higher probability of using prohibited substances that have the potential to increase sports performance in male athletes, with a significant gender difference in basketball and handball

- in men, a higher probability of doping is found in athletes who have achieved high performance at junior-age level, those who consume dietary supplements regularly, and those who perceive the sport they practice as being contaminated by doping

- in women, a greater possibility of doping is found in those involved in binge drinking, and a lower tendency is found in those who have a better knowledge of sports nutrition

- for the study of doping in team sports future research must take into account the psychological factors

Doping in volleyball is of interest, for example in Japan between 2006 and 2009 anti-doping tests were conducted, the number of tests increasing each year, and out-of-competition testing became a larger percentage of the total number of tests (Hashimoto et al, 2011). Considering these facts, in this revision type work we analyze the factors that influence the specific doping in volleyball, also discussing the trainer's point of view, which consists in the importance of obtaining performances, self-improvement, increased resistance to effort, stress control.

Factors influencing doping in volleyball

One of the justifications for using anabolic steroids is the somatotype of volleyball players. Thus, a study comparing a group of students from the Warsaw University of Technology with a group of volleyball players in the second division revealed that the latter have not only greater height but also significantly greater body weight (Pastuszak, Buśko & Kalka, 2016). Regarding the doping with androgens of volleyball players, it should be

mentioning the case of the administration in the former East Germany of Mestanolone, which was valid only as an experimental preparation produced by the ZIMET research institute, but was also given to the gymnasts, handball and volleyball players (Schäker et al, 1980) cited by (Franke & Berendox, 1997) without having been approved for use in humans, not even in clinical phase I testing (Franke & Berendox, 1997). Our studies have shown that, unlike basketball players, the active musculature of volleyball players is not characterized by a higher proportion of tonic fibers [Hagiu, Iacob & Puni, 2017). However, volleyball players have a higher oxygen volume than basketball players (Ibikunle & Ubaezuonu, 2016). In junior volleyball players, males, increased endurance, speed and strength are moderately associated with improved aerobic endurance (Kafkas, Çinarli & Kafkas, 2019). High intensity endurance resulted in decreased red blood cell counts, red blood cell concentration and hematocrit, and these trends are significantly correlated with training duration (Bandyopadhyay, Chatterjee & Chatterjee, 2008). All these morphofunctional features induced by the specific training in volleyball predispose to erythropoietin and erythrocyte mass doping. A recent study of volleyball players revealed differences in strength between symmetrical muscles, but also imbalances in the strength of antagonists (Kim & Jeoung, 2016), which in our opinion can predispose not only to injuries but also to the musculotendinous pains. These musculoskeletal changes probably require the use of analgesics. Apart from the morphofunctional criteria, doping can also be influenced by psychological criteria. Thus, a study found that volleyball players (the best league team in Poland) may not differ from the control group (sedentary people) in terms of overcoming stressors (subjective graduation of stressors); however, exposure to training-based stressors seems to promote cortisol response to the anticipated stressor (Dziembowska et al, 2019). Psychological and physical pain have common mechanisms and in some cases can be treated by the same drugs (Hagiu, 2018), so the increased sensitivity to psychological stress of volleyball players may be an additional reason for using analgesics. For elite athletes, including volleyball players, there is a gender difference in the risk of doping, and specific factors need to be analyzed by the sports doctor and coach to support the team (Sekulic et al, 2016). Without specificity for volleyball, but with the possibility of extrapolation, a socio-cultural analysis of gender-based doping revealed that female athletes feel pressured to adhere to social standards in terms of ideal body composition, and although the substances used are not prohibited in

sport, they are unhealthy and are a concern for prevention programs (Weaving & Teetzel, 2019). Optimizing body composition in athletes can be facilitated by the use of hormonal preparations. Thus, given the need for a large muscle mass, female volleyball players may be tempted to doping with hormonal preparations to a greater extent than male athletes.

Conclusions

Factors influencing doping of volleyball players predispose to the use of anabolic steroids, erythropoietin and erythrocyte mass, and also analgesics.

Increased sensitivity of volleyball players to psychological stress may be an additional cause for analgesic doping.

In the prevention programs, the trainer has an essential role, which must take into account the possibility of greater predisposition of female athletes to use substances intended to optimize body composition.

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PHYSICAL EXERCISE STRATEGIES FOR PARKINSON'S DISEASE

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Abstract

Parkinson's Disease (PD) is the second most common prevalent neurodegenerative disease succeeding Alzheimer's disease. Cardinal motor symptoms of the PD are resting tremor, plastic-type muscular rigitidy, bradykinesia and postural instability. These symptoms are caused by the deficiency of a neurotransmitter dopamine. Due to degeneration of dopamine producing cells located at basal ganglia and substantia nigra which are the areas of cerebral hemispheres. The main purpose in an exercise prescription for a person with PD should be a prevention against impairments in motor functions, life quality and preserving the independence of a person with PD.

In this context an exercise prescription should include cardiorespiratory exercise (First option; ≥ 3 days per week, vigorous intensity, ≥ 60 % Heart Rate Reserve, 20-60 minutes weight bearing exercise a day. Second option; ≥ 5 days per week, moderate intensity, ≥ 40% to 60 % Heart Rate Reserve), resistance exercise (2 to 3 days per week, moderate to intense 60 % to 80 % of the 1 RM, 8 to 15 reps for each major muscle group), flexibility exercise (≥ 2 to 3 days per week, 10-30 sec. static stretching at the point of discomfort) and neuromotor exercise (≥ 2 to 3 day per week, a session ≥ 10 to 15 min per day, balance, agility, coordination etc). According to health and exercise authorities, these exercise types have been tolerated well by a person with PD. With regard to exercise sciences, every person with PD should be evaluated on an individual basis.

Key words: Parkinson's Disease, Resistance Exercise, Cardiorespiratory Exercise, Flexibility Exercise, Neuromotor Exercise

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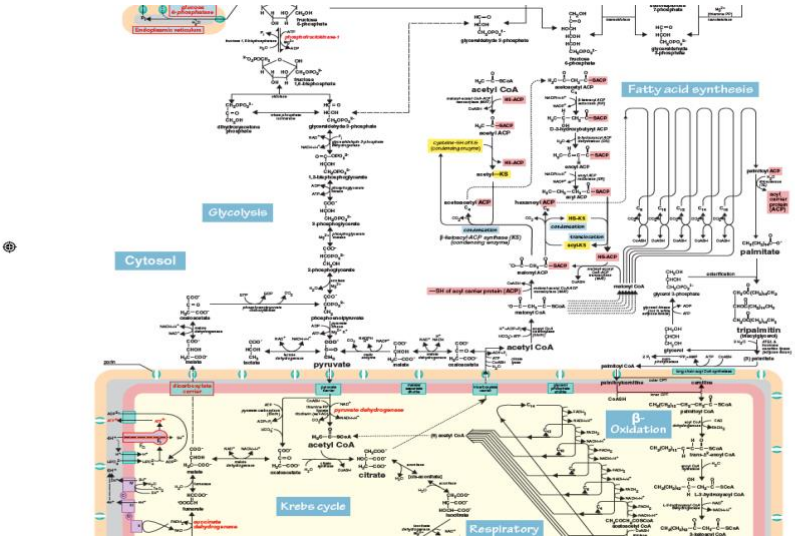
GENETIC AND METABOLIC APPROACH FOR EXERSICE AND SPORT

Ümit Zeybek, Ph.D.

Metabolic map may look confusing at first glance due to lots of incomprehensible chemical formula. Complexity of metabolic maps is a fact and we should not forget that they are no different from some kind of map. In many ways it is similar to the map of the London Underground complex. To reach the destination on the subway, we should just concentrate on our own way and forget the other details. A similar route can be followed when studying the metabolic map. Details of enzymatic reactions are complex and substantial.

Metabolism: Is converting the energy that living things need to survive, from the sources obtained to the body. The meaning of the word, 'change-turn'



Metabolism at a Glance, J. G. Salway

➨ Mitochondria

Some people are supposed to burn much more energy to produce heat while some others own effective mitochondria in energy production. Heat production is a natural structure and function of these cells and is one of the most important ways to warm up our body in cold climates. People in hot climates have a higher efficiency and produce more heat than those in cold climates. According to a study performed on selected Finnish athletes, those who specialize in endurance were found to own more effective mitochondria.

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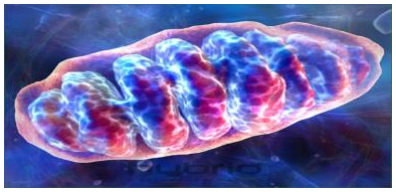

➨ Ergojenics

Ergogenics is general name of support products received to improve athletic performance. These substances consist of legal or illegal nutritional supplements. These products, may be useful to improve physiological properties associated with exercise performance or to overcome limitations in physiological capacity. The habit of using nutritional supplements in people who are professionally engaged in sports and fitness, and even those who exercise daily is very common all over the world. Different effects can be observed from multiple sources which are related to the effect of nutritional supplements on sport performance. So what information should be relied on? The clinical study performed by the people dealing with science methodology can be observed. The most accurate approach must be the Metabolic Analysis.

EsansiyelAmino Asitlerden LimitingAmino Asitler				
	Sonuç	Birim	En az	Beklenen düzey
Lizin	230	µmol/L	103	
Metiyonin	27,9	µmol/L	4	
Triptofan	86	µmol/L	29	
EsansiyelAmino Asitlerden Dallı Olanlar				
	Sonuç	Birim	En az	Beklenen düzey
İzolösin	97	µmol/L	36	
Lösin	183	µmol/L	68	
Valin	264	µmol/L	136	
EsansiyelAmino Asitlerden Diğerleri				
	Sonuç	Birim	En az	Beklenen düzey
Fenilalanin	90	µmol/L	35	
Histidin	109	µmol/L	39	
Treonin	117	µmol/L	85	

➨ Genetic Approach

Parents often want their children to participate in extracurricular activities such as sports and arts. Even 'Capable thats about your child' sentence will be expected from people who train their children and those who are watching the activity. It is not very important

to be talented if you are only interested in doing sports. Nevertheless, the "capability" gains much more importance when the subject is sports competition. So how do we make this choice? The performances of two people who perform the same activity may also be different.

Could the answer be the "**genetics**"? Since the "trainability" properties are different between human beings, genes are among the determining factors. In particular, research on genes that may have an impact on athletic performance has come to the forefront nowadays. Because a variety of genetic between individuals which translates to difference of genes between humen (polymorphism), may affect metabolic activity. The genetic structure, as well as nutrition and training which determines the potential in sports, plays one of the most important roles. However, our genes can also lead to limited performance.

- **Epigenetic**

Epigenetic mechanisms control gene expression directly or indirectly. However, epigenetic changes which are reversible and do not change DNA base sequences, are separated from the back mutations.

Genes

Impact: Training

G x I interaction

G and I correlation

Elite athletes may be born with an appropriate genetic structure, but they cannot reflect their potential due to the lack or failure of antrenization. As a result of years of research and experience, it is understood that the difference in "trainability" is mostly related to genes. For this reason, studies on genes that may affect athletic performance are still ongoing.

- **α-Actinin-3 Gene and Actinin**

Is specifically expressed in muscle myofibrils which are responsible for fast energy supply. This provides evolutionary advantage due to increased sprint performance. Actin gene R577X gene polymorphism has been studied frequently in athletes. As a result of this study, 577R allele was found to be higher in elite sprint athletes.

- **Erythropoietin Receptor**

Mutation of the gene which is responsible for secretion of a protein known as Erythropoietin receptor (EPOR) is thought to be associated with oxygen scavenging capacity.

- **Insulin-Like Growth Factor-1 (IGF-1)**

Studies have reported an increase in quadriceps-muscle strength as a result of a variation in the IGF-1 promoter.

- **Genetic Interaction with Muscloskeletal Trauma or Damage**

In recent years, the genotypic characteristics of the athletes can be utilized in addition to medical planning such as surgical interventions, physical / therapeutic applications and orthopedic approaches, which are among the factors that play a role in the processes of muscle injury and recovery, which vary from person to person.

- **Growth / differentiation factor 5 (GDF5)**

In addition, growth / differentiation factor 5 (GDF5) gene associated with muscle damage susceptibility or healing properties is shown to be a feature related to exercise associated muscle damage and injuriy.

➨ **What happens if we share our genes?**

Today, in the light of genetic analysis, the results in additon to training / exercise data may provide more effective and athletes / person-specific approach. In athletes screening, benefiting form genotypic detection, a follow-up based on training-gene interactions can be created from an early age.

➨ **Genovasyon; Analyzes of Genetic Predisposition**

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Volume: 6 Supplement December 2019
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REHABILITATION IN TENDINITES

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Abstract

The tendon is the area where the muscles adhere to the bone, and its main task is to transmit the energy of movement in the muscle to the bone. Tendon damage or problems are generally collected under the title of tendinopathy. Tendinopathies are classified as tendinosis, tendinitis and tenosynovitis. Tendinosis; it is the degeneration of collagen in tendons and manifests itself with increased vascularity. The general reason is overuse. Tendinitis is degeneration and inflammation of tendons. The main cause is acute overload. As an example of this situation; supraspinatus, biceps tendinitis, achilles tendinitis, tibialis anterior tendinitis. Tenosynovitis is the inflammation of the tendon sheath that surrounds the outermost tendon.

To summarize, the development of tendinopathy;

- Overuse-overuse; it is often associated with sports injuries.

- Degeneration with age, especially in inactive individuals; tendon flexibility decreases with age.

- Risk group:

* Athletes

* Housewife, carpenter, gardener, carpet weaver, humorist

* Infection, arthritis, tiriod pathologies, gout, DM

Tendinopathies are frequently encountered; clinical features include pain-local tenderness, swelling, temperature increase, redness, crepitation, limitation of range of motion, and muscle atrophy. Regardless of the tendon, there is an increase in the release of some mediators such as growth factors, cytokines, inflammatory factors, and matrix regulation. This causes pain and tissue damage in that area. A good anamnesis is essential for the diagnosis of tendon injuries. A physical examination and loading ultrasound, magnetic resonance imaging and blood biochemistry are then important.

General approach in the treatment of tendinopathies; medical treatment, physical therapy, exercise and injections. Medically non-steroidal anti-inflammatory drugs are the first choice. Infections include steroids, hyaluronic acid, platelet-rich plasma (PRP),

prolotherapy and stem cell therapy. ESWT and ultrasound therapy are often preferred as physical therapy. Of course, exercise program-rehabilitation, which has a very effective place in treatment, is very important.

Common tendinopathies:

* Tennis player and golfer's elbow

* Rotator cuff tendinitis; impigiment syndrome, biceps tendinitis

* Jumper knee-knee tendonitis; quadriceps and patellar tendinitis

* Achilles tendonitis

The target in the treatment of tendinopathies; pain reduction, athlete compliance, exercise selection, effective loading strategy and muscle and tendon healing is to give the appropriate load. Tendinosis and tendinitis approach should be different in treatment. In tendinosis, the target should be to increase collagen synthesis and to suppress inflammation in tendinitis. Therefore, non-steroidal anti-inflammatory drugs are indicated for tendinitis and contraindicated in tendinosis because they inhibit collagen production. The results of the treatment are 10 weeks in tendinosis, whereas in tendinitis, the average duration is one month.

The tendons heal as the first stage is the inflammatory phase. This takes about 1-2 days. The subsequent proliferative stage was 3 weeks and the last stage of remodeling was 1 month. In this context, exercise program should be arranged for the patient.

Exercise program in tendinopathies:

Stage 1: Start with isometric exercises. There should be little pain during isometric exercise. 5 repetitions in 45 seconds, 2 to 3 times per day; 70% maximum voluntary contraction is recommended.

Stage 2: Continue with isotonic exercises. There should be very little pain during isotonic exercise. 15RM; 3-4 sets, increases 6RM, recommended at the limit of fatigue.

Phase 3: Energy loading exercises-Pilometric exercises continue. Adequate reinforcement; pain should be done at the border.

4. Return to sport: should be done after reaching a certain level. Progressive competition studies are important.

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Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

Increasing Exercise Motivation: Self Determination Theory Perspective for Exercise Leaders' Optimal Behaviours

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Exercise Motivation Models

Many studies have tried to explain why individuals perform some behaviour. If it can be determined why individuals behave in a certain way, these behaviours can be affected in the most ideal way by controlling the factors that affect them. In this context, many theories have been conceptualized on why exercise participants start exercising, maintain this behaviour and drop out. When these theories are gathered together according to certain characteristics, five different models emerge. These; belief/attitude models, competency based models, stage based models, control based models and mixed models (Figure 1).

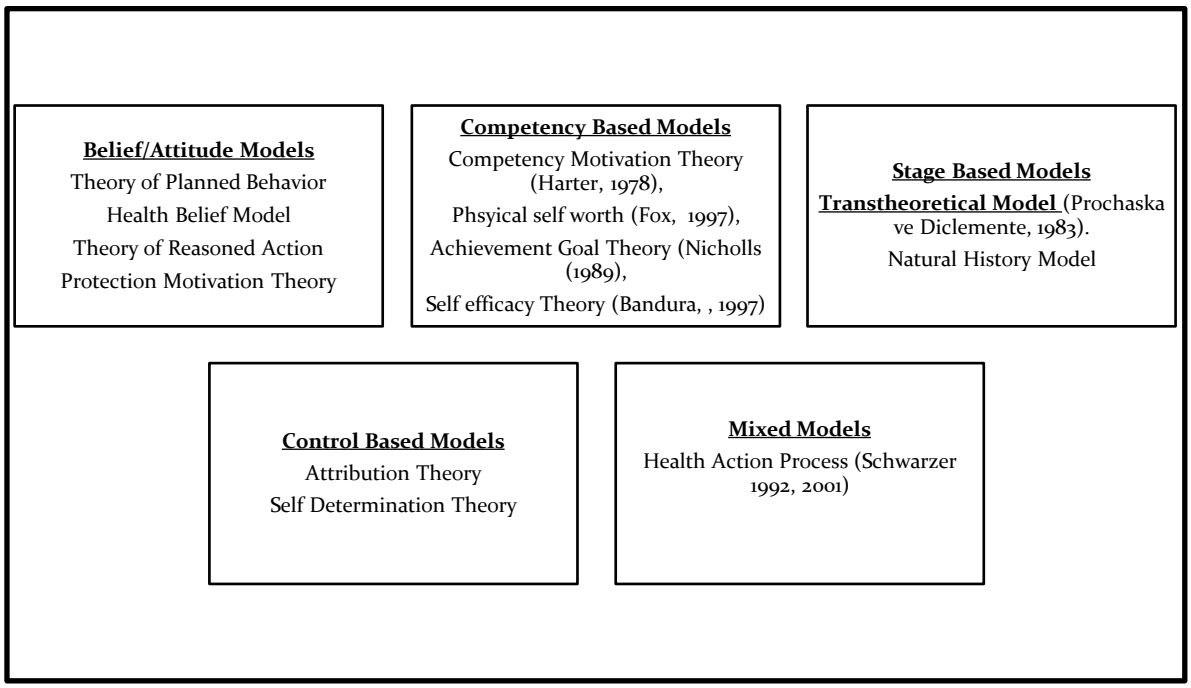

Figure 1. Exercise Motivation Theories

As seen in Figure 1, many different models have tried to explain individuals' behaviours by examining exercise motivation from different points of view.

In this research, explanations on Self Determination Theory which is one of the control based models will be made and suggestions will be presented for exercise experts.

Self Determination Theory to Explain Exercise Motivation

Self Determination Theory suggests that individuals have some basic psychological needs that they bring from birth. These psychological needs are the basics of Self Determination Theory (Ryan and Deci, 2000). Self Determination Theorists have named these needs as basic psychological needs. The basic psychological needs are autonomy, competence and relatedness (Ryan and Deci, 2000; Andersen, 2000; Vansteenkiste and Ryan, 2013). The need for autonomy refers that individuals have the need to make their choices and decisions. An example of this need is that the exercise participant has a chance to choose in the activities. The need for competence is that one needs to feel competent on certain behaviours. Being able to do a desired behaviour can be given as an example for competence need. Also exercise participants' need to feel self-sufficient in the exercise environment can be given as an example. On the other hand, the need for relatedness is the need to be together with other people in order to sustain one's life. The person needs to be able to interact with other people and feel the sense of warmth and trust (Kaya & Sarı, 2016). An example of this need is that the individual thinks that he / she is cared about by the exercise specialist in the exercise environment. Satisfaction with these needs is necessary for individuals to grow, integrate, develop, mental health and well-being (Ryan and Deci, 2000; Andersen, 2000; Vansteenkiste and Ryan, 2013). Satisfying the basic psychological needs of exercise participants can increase their motivation to work harder and to provide them with optimal efficiency from exercise experiences. In addition, autonomous motivation, which is a kind of high quality of motivation expressed in Self Determination Theory, can be obtained by satisfying the basic psychological needs.

Autonomous Motivation

Self Determination Theory explained the concept of motivation on a line. There is intrinsic motivation on the far right and amotivation on the far left and external motivation with four different types in the middle. The autonomous form of motivation is the most ideal type of motivation.

Amotivation	Extrinsic Motivation	Intrinsic motivation

Amotivation	External regulation	introjected regulation	Identified regulation	Integrated regulation	Intrinsic motivation
No motivation	Most Controlled	Relatively Controlled	Relatively Autonomous	Autonomous Motivation	Completely Autonomous

Figure 1. Self-determination continuum (Gagné and Deci, 2005) p336; Sarı, 2019).

Need Supporting and Need Thwarting Exercise Leaders

Research has shown that the exercise leader can act as a need thwarting or need supportive. There are many positive effects of need supportive behaviours of exercise leader while need thwarting behaviour can prevent satisfaction of the basic needs. These behaviours are shown in figure 2 (Edmunds, Ntoumanis, & Duda, 2007; Ng et al., 2012; Teixeira, Carraca, Markland, Silva, & Ryan, 2012; Edmuns et al., 2008; Bartholomew, Ntoumanis, Thogersen-Ntoumani De Meyer et al., 2014; Gunnell, Crocker, Wilson, Mack, & Zumbo, 2013).

Need Supporting Exercise Leader	Need Thwarting Exercise Leader
• Satisfaction of basic psychological needs • Commitment to exercise • Intention to exercise • More positive emotions • Satisfaction of participants • Finding resources more useful • Low anxiety	• Inhibiting basic psychological needs • Controlled Motivation (to be motivated for guilt, external wishes and rules)

Figure 2. The effects of need supportive and thwarting exercise leader behaviours.

How Can Exercise Specialists Gain Need Supporting Behaviours?

The researches about how satisfaction of the basic psychological needs of exercise participants are met by exercise leaders showed that many methods can be used in order to educate exercise leaders to teach them need supportive behaviour in exercise sessions. In these researches, exercise experts participated in various practices and developed their skills to satisfy the basic psychological needs of exercise participants (Thøgersen-

Ntoumanii et al., 2019; Kinnafick, Thøgersen-Ntoumani & Duda, 2016; Duda et al., 2014; Duda et al., 2014; et al., 2018). These methods can be seen below.

The methods used in the relevant researches to teach need supportive behaviours to exercise leaders;

- Informing exercise leaders about basic psychological needs
- Diaries
- Printed materials
- Action plans
- Videos
- Online discussions
- Workshops
- Goal setting exercises
- Practices in the studio (spinning, personal training, pilates etc.)
- Exercise leaders share their experiences with each other
- Role playing
- Applied trainings in studios
- Group discussions

Suggestions for Exercise Practitioners

Suggestions for Managers

- Employee training should be provided.
- Technology use for satisfaction of members' needs.

Suggestions for Exercise Leaders

For the need for autonomy

- Give a reason / explain what you do.
- Encourage questions from participants.
- Avoid controlling language.
- Duplicate internal participation reasons such as fun and interest.
- Offer a choice to participants (not many 2-4). Involve participants in creating and modifying the activities of the session.
- If the exercise participant is expressing an idea, listen.

For need for competence

- Give positive feedback on skills.
- Set aims.
- Make exercise sessions that will ensure the success of the participants.
- Compare the participant with himself, not with anyone else.
- Encourage development and effort.
- Errors / omissions should not be highlighted
- Exercise drills for the participant's needs

For the need for relatedness

- Accept emotions, ask how you feel.
- Establish close relationships.
- Apply interactive activities.
- Make the exercise participant feel important.
- Highlight cohesion in group classes

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Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

PRINCIPLES OF MEDICAL EXERCISE THERAPY IN ARTHROSIS AND RHEUMATOID ARTHRITIS,

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Abstract

Arthrosis (degenerative osteoarthritis) is a common joint disease throughout the world, characterized by disruption of joint cartilage and underlying bone integrity, causing disability in adults. The main purposes of rehabilitative approaches in treatment of arthrosis are sustaining joint protection and pain relief, decreasing loss of function and disability to improve the quality of life. Current literature emphasizes that non-drug modalities are cornerstones in the treatment of arthrosis and it is of utmost importance to combine them with pharmacological treatments. The non-drug treatment program includes patient education, joint protection, weight control, correction of posture disorders, regular exercise, assistive devices and orthoses, ambulation devices, physiotherapy modalities, thermal spring therapy, manual therapy modalities and acupuncture. Prescription of an exercise program should take the patient's age, comorbid diseases, general mobility, severity of pain and joint stability into consideration. It should initially be applied under supervision and then converted to a home program. The exercise program in arthrosis includes joint range of motion (ROM) , aerobic, strengthening, stretching and aquatic exercises, proprioceptive reeducation. It has been shown that regular aerobic exercise program increases aerobic capacity and physical activity in patients with arthrosis - both in short and long term - while also increasing the quality of life by reducing anxiety and fatigue and supporting patient motivation.

Rheumatoid arthritis (RA) is a chronic, systemic, inflammatory disease, primarily of joints. In rheumatoid arthritis; high disease activity, physical inactivity and changes in muscle metabolism results in degeneration of muscle fibers, muscle weakness and loss of muscle mass in later periods. The loss of muscle strength is even greater and earlier in patients with RA who have been receiving corticosteroid treatments for a long period of time. Rheumatoid arthritis (RA) has active disease and remission periods and the treatment program includes both pharmacological and non-pharmacological treatment. Similar to arthrosis, non-pharmacological treatment of RA includes patient education, joint

protection, exercise therapy, rest periods and splinting, assistive devices and equipment, physical therapy modalities, thermal spring therapy (only in non-active period) and laser treatment. The goals of exercise therapy in RA treatment are maintaining joint ROM, increasing muscle strength and endurance along with bone mineralization and aerobic capacity, reducing the need for analgesic drugs and improving quality of life in general. Exercise program for RA patients includes range of motion sustaining, stretching, strengthening, aerobic and aquatic exercises. Disease activity, inflammation, ongoing deformities, extra-articular disorders (pericarditis, vasculitis etc.) and the general condition of the patient should all be taken into account to set the optimal exercise program. It is reported that, when started in early periods and continued regularly, the dynamic and aerobic exercise program increases joint mobility and muscle strength, improves aerobic condition and functions while also improving psychological state of the patient without increasing general fatigue and joint symptoms. In conclusion, exercise is found to be the most effective non-pharmacological treatment for RA.

Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

COMPARISON OF THROMBOCYTE RICH PLASMA AND ESWT TREATMENT IN CHRONIC LATERAL EPICONDYLITIS TREATMENT

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Introduction

Lateral epicondylitis (LE), also known as tennis elbow, is a common elbow problem and often affects active people aged 30-50 years [1, 2] The insidence is 4/1000people per year[3]. Definitive etiology is not fully understood but it is thought that factors such as overuse injury and direct trauma on the lateral epicondyle plays a role in the LE[4]. The goal in LE treatment is to prevent loading into the arm, to reduce pain, to accelerate healing, and to provide rapid return to daily activities. Very different treatment modalities are described in the literature, either alone or in combination. Various treatment modalities have been suggested for LE treatment including resting, activity modification and restriction, cold application, bracing, oral and topical nonsteroidal antiinflammatory (NSAI) drugs, physical therapy, acupuncture, local injections (corticosteroids, prolotheraphy, botulinum injection, platelet rich plasma(PRP)), Electroshock wave therapy(ESWT), ultrasound therapy[5]. Surgical release may be needed in the case of failed conservative treatment. PRP has been shown to give long term improvements in patient symptoms. ESWT has been widely used in many musculoskeletal problems over the last 25-30 years[6, 7]. The mechanism of action of ESWT is unknown, but it possibly includes direct stimulation of the healing process, neovascularization, disintegration of calcium and neural elements. It is suggested that shock waves accelerate tissue healing, reduce calcification, inhibit pain receptors with denervation. These may involve alterations of the permeability of cell membranes preventing the development of potentials to transmit painful stimuli, direct suppression on nociceptors and a hyperstimulation mechanism which controls gate control mechanism[8]. Despite that many studies on LE treatment are in the literature, the most appropriate treatment is still controversial. However, there is not enough scientific evidence to support the effectiveness of each treatment modalities[9]. For

this reason, we aimed to compare the short and mid term results of PRP and ESWT in the treatment of chronic lateral epicondylitis.

Materials and Methods

We retrospectively evaluated 48 patients (48 elbows) treated for chronic LE (24 patients with PRP injection and 24 patients with ESWT) at our institution, from January 2015 to October 2017. The inclusion criteria were as follows: patients were between 18 and 65 years of age, sensitivity on the lateral epicondyle, positive diagnosis of LE diagnosis, No treatment for LE within the last 3 months. Exclusion criteria were the presence of any treatment for lateral epicondylitis within the last 3 months, pregnancy, hemostatic disturbance, upper extremity tumor, local or systemic infection, pacemaker attachment, elbow arthritis, posterior interosseous nerve (PIN) syndrome, and radiculopathy. Treatment and evaluation were done by different physicians. Before the application, demographic data of the patients, the duration of the illness, the side of the complainant, the dominant side, and additional systemic diseases were recorded to the previously prepared forms. Both groups were treated with wrist splinting, ice treatment and resting.

Evaluation

Patients were evaluated with Patient Rated Tennis Elbow Evaluation Turkish Version (PRTEE - T)[10]. The level of pain at rest, compression and activity was assessed as 0-10 points (0 no pain - 10 very painful) with visual analogue scale (VAS). Scores were assessed 3 times before, after 6 th month and 12 th month after the treatment.

Gripping Forces Measure

The maximal gripping forces of the jamar dynamometer were measured before and1 month after the treatment of the patients. Hand dynamometry (Jamar dynamometer, Preston Healthcare, Jackson, USA) was used for the procedure. The procedure was performed while sitting in a chair and the forearm was in a comfortable position at 60 degrees flexion on the table. The patient requested a maximum squeeze of the jammer. This process was repeated 3 times and the average value was recorded.

ESWT Treatment

ESWT procedure was performed by the same physiotherapist (NE). A BTL device (BTL 6000 SWT TOPLINE, UK) was used for ESWT. Without applying local anesthesia to the marked area, R15 applicator was used with a hand gun at 1500 pulse counts at a frequency of 15 Hz and at an energy density of 2.4 bar; The peripheral muscles were

applied with a D35 applicator tipped hand gun at 1500 pulse counts, using a gel at the interface at an energy density of 1.8 bar at a frequency of 21 Hz.

PRP Treatment

Patient treated with PRP injections, a blood sample of 150 mL was taken from the patients. The blood underwent a standardized protocol of preparation, which consisted of two centrifugations (Hettich Zentrifugen®; Hettich Lab technology, Tuttlingen, Germany): the first at 1500 rpm for 6 min, the second at 3500 rpm 12 min. Our institute protocol provides one 6-mL injections of PRP for each patient. The injection was always performed in sterile conditions. We decided to use the tenderness point to better assess the soft tissue target.

Statistical Analyzes

Statistical analyzes were performed using SPSS version 21.0 software. The normal distribution of variables was examined visually (histogram and probability plots) and analytical methods (Kolmogorov-Smimov / Shapiro-Wilk tests). The pre-treatment, post-test, and control measures included changes in the groups themselves using the repaired measures ANOVA test. Paired t test was used to assess post-hoc Bonferroni adjustment if the results were significant. The ANCOVA test was used to compare changes between groups. Statistically significant results were obtained when the p-value was below 0.05.

Results

The demographic data of the patients are shown in table 1. There was no statistical difference between sex and dominant hand in both groups. When statistical evaluation was made, changes within the groups themselves were evaluated first. For this, pretreatment, 6 th month and 12 th month outcomes were assessed using the repaired measures ANOVA test. Paired t test was used to assess post-hoc Bonferroni adjusted adjustment if the results were significant.

Tablo 1	ESWT n=24	PRP n=24	P değeri
YAŞ	45,2±1.5	45.4±1.8	0.454
CİNSİYET(K/E)	16K / 8E	15K / 9E	
TARAF(Sağ/Sol)	14 /10	18/6	
BMİ (Kg/cm2)	27.8±4.43	27.2±3.1	0.538
Semptom Süresi (Ay)	6.04±1.7	6.08±1.6	0.677

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statistically significant change in the grip strength of the PRP group between the pretreatment and 6th month control over time. (p <0,05) VAS values and PRTEE-T scores were significantly lower in patients who underwent PRP compared to ESWT group at 6 months (P<0.001). No significant difference was found between the VAS, PRTEE-T and grip strength measurements between the treatment groups before and after the 6 th month and 12th month control measurements (p = 0.256).

Tablo 2 Gruplar	Tedavi öncesi		Tedavi sonrası 6. ay		12. Ay Kontrol	
	Kavrama Gücü	P değeri	Kavrama Gücü	P değeri	Kavrama Gücü	P değeri
PRP	45.9±19.2	0.621	55.02±17.6	0.554	52.7±18.2	0.256
ESWT	43.5±13.2		52.11±6.08		47.1±15.6	
Gruplar	Tedavi öncesi		Tedavi sonrası 6.Ay		12. Ay Kontrol	
	VAS skoru	P değeri	VAS Skoru	P değeri	VAS Skoru	P değeri
PRP	6.1±1.8	0.584	5.2±2.0	0.484	4.3±2.0	0.263
ESWT	6.4±1.2		5.5±1.6		5.0±1.9	
Gruplar	Tedavi öncesi		Tedavi sonrası 6.Ay		12. Ay Kontrol	
	PRTEE-T Skor	P değeri	PRTEE-T Skor	P değeri	PRTEE-T Skor	P değeri
PRP	78.08±25.7	0.650	66.00±30.1	0.913	59.45±31.5	0.723
ESWT	75.12±18.4		65.20±18.2		62.16±19.6	

Conclusion

This study compared ESWT and PRP results in patients with lateral epicondylitis. According to our results, PRP injection and ESW therapy both are feasible and safe options for the treatment of chronic LE with low risk of complications and with acceptable mid-term follow-up results. Longer term randomized comparative studies are necessary to determine more objectively the correct definition of the first-line treatment for ESW and PRP injections.

Conflict of Interest

None declared.

Funding Sources

The authors declared that this study has received no financial support.

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2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

NUTRIENT TIMING: RESISTANCE TRAINING

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What is Nutrient Timing?

Nutrient timing is a topic of interest that has been discussed frequently in recent years. From a historical perspective, nutrient timing has often been interpreted as synonymous with carbohydrate intake. It has been used alone instead of carbohydrate intake or carbohydrate loading. This false idea dates back to the 1928 Olympics when marathon runners consumed carbohydrates before the races. Although nutrient timing has been adopted by some athletes and coaches after this date, it took time for a scientifically systematic approach to develop. A thorough search of the relevant literature will show that since the 1960s, carbohydrate loading (which is very common, particularly among distance runners) has been well documented. Since then, many studies have stressed that carbohydrate loading will help both regenerate muscle and liver glycogen stores (Bussau et al., 2002; 2002; Goforth et al. 2003; Kavouras et al., 2004; Sherman et al. 1981; Yaspelkis et al. 1993) and maintain blood glucose levels (Coyle et al., 1986; Kavouras et al., 2004; Campell and Spano, 2011). Nutrient timing is a planned alteration of macronutrient intake in order to promote health, workout performance, and get/stay lean. Nutrient timing strategies are based on how the body handles different types of food at different times. One of the most important nutrient timing principles is that it's best to eat most non-fruit and veggie carbohydrates during and after exercise.

Nutrient timing has several important goals:

- Nutrient partitioning (where the nutrients go when you ingest them)
- Improved health
- Improved body composition
- Improved athletic performance
- Enhanced workout recovery

However, trying to understand the concept of nutrient timing under the title of carbohydrate loading will be quite inadequate. Today, advances in the sciences of nutrition

and exercise offer valuable results, especially about the timing of nutrients before, during, and after training. Nutrient timing is commonly practiced by both coaches and athletes. However, the approach followed in particular on nutrient timing practices does not go beyond interpretations that have no scientific basis. Therefore, the discussion of nutrient timing in the light of scientific knowledge will provide unique contributions to both literature and the field. Also, when the relevant literature is examined, it can be seen that although there are a lot of studies on the timing of carbohydrate intake, the timing of protein consumption has been scarcely investigated. Therefore, this paper focuses on explaining the mechanisms of the timing of protein consumption. This aspect of the research will make unique contributions to the literature.

Protein Consumption Before Training

Many people try to meet most of their daily protein needs before resistance training. It is thought that by doing so, they aim to optimize protein synthesis for increased intramuscular and extramuscular anabolic processes induced by resistance training (Coburn et al., 2006; Cribb and Hayes, 2006; Kraemer et al., 2007; Tipton and Wolfe, 2001; Willoughby et al., 2007) and to minimize possible muscle (protein) degradation (Kraemer et al., 2007; White et al., 2008). A study investigating pre-workout protein consumption emphasized that consuming 20 g of protein before resistance training for ten weeks could lead to increases in lean body mass, strength, and some muscle hypertrophy markers after ten weeks (Willoughby et al., 2007). It was emphasized in the same study that carbohydrate (20 g) consumed together with 20 g protein has the potential to affect more anabolic hormones and intramuscular hypertrophic markers. In conclusion, although the literature findings are controversial, consuming approximately 20 grams of protein or amino acid before resistance training may have positive effects on both strength and hypertrophy parameters.

Protein Consumption During Training

The number of studies that have investigated the possible effects of nutrient consumption during resistance training is very limited. However, it is claimed that carbohydrate or protein consumption during resistance training will contribute to the maintenance of muscle glycogen stores and the prevention of muscle degradation (Haff et al., 2000; Bird et al., 2006). Haff et al. (2000) determined that 1 g carbohydrate intake per

kg before and during (every 10 min) resistance training provided a higher muscle glycogen level (49% higher according to biopsy results) compared to the placebo group. In a research design in which both carbohydrate and protein were consumed in combination during resistance training, cortisol, which has the potential to affect protein degradation level, was found to be higher in the group that did not receive nutrients (105%) (Bird et al., 2006). To sum up all these findings, it has been reported that the consumption of carbohydrate alone or combination of carbohydrate + protein during resistance training will maintain muscle glycogen stores and cause increases in skeletal muscle cross-sectional area and decrease in protein degradation level (Bird et al., 2006a, 2006b, 2006c; Haff et al., 2000). In fact, those involved in resistance training can take both carbohydrate and protein (amino acid) together during training. These nutrients taken during resistance training will help maintain and restore muscle glycogen stores. These nutrients will also contribute to the reduction of catabolic processes (such as protein degradation) and increase anabolic processes (such as protein synthesis).

Protein Consumption After Training

People involved in resistance training usually consume protein after workout. The reason for this commonly adopted habit is shown to be the stimulation of protein synthesis and degradation after resistance training (Phillips et al., 1999; Pitkanen et al., 2003). Nutrient intake after resistance training is known to have positive effects on protein synthesis and degradation (Phillips et al., 1999). Also, it has been stated that amino acids consumed after resistance training will cause an increase in plasma amino acid levels (Biolo et al., 1997; Borsheim et al., 2002). In support of this opinion, it was also emphasized that carbohydrates (between 20 and 40 g) consumed in combination with amino acids (between 6 and 12 g) after resistance training would increase protein synthesis (Tipton et al., 2001). In this context, the presence of sufficient amino acids in the bloodstream after resistance training is essential for increasing lean body mass (Biolo et al., 1997; Tipton et al., 1999a). When nutrient preference after resistance training is examined from another perspective, the literature draws attention to carbohydrate consumption. It has been reported that the intake of large amounts of carbohydrates (around 100 g) after high-intensity resistance training leads to a balance between protein production and degradation (Borsheim et al., 2004). No study has been conducted until now that has reported that carbohydrate consumption is not the right choice after resistance

training. Moreover, the potential of carbohydrate consumption to increase glycogen resynthesis after resistance training is frequently emphasized (Ivy et al., 2002; Tarnopolsky et al., 1997). In light of this information, instead of protein consumption alone, consumption of carbohydrates in combination with protein will be a more effective strategy after resistance training. In light of all this information, we can argue that consumption of whey protein alone or consumption of whey or casein proteins in combination after resistance training is important for protein synthesis optimization. Furthermore, consumption of whey and casein proteins in combination after resistance training can be a highly effective strategy for increasing total muscle mass.

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Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

THE NATURE OF THE HUMAN MOVEMENT

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Background

Over the last decades, the science of exercise has made significant progress in creating optimal exercise prescriptions. In general, a question that is often asked by many people is how much exercise should I do. The answer is quite paradoxical. However, I will try to roughly describe what the weekly exercise prescription is. In this context, it should be remembered that each individual's need for physical activity will differ individually. The recommendations mentioned here should be considered as the minimum level to be followed. ACSM (American Sports Medicine Association) stands out as the most referenced institution in the world in the preparation of exercise prescriptions. According to this association, at least 150 minutes / week of moderate- intensity (40-70% VO2max) as the weekly training period of the modern world person and 2-3 days / week of training (50-75 minutes per session) it is recommended to do. Another alternative exercise prescription of the Association is 75 min / week vigorous-intensity (75% and more VO2max) and 2-3 times / week (20-25 min each session) exercise. The Association's average prescribing exercise recommendation is often taken into account almost all over the world. This recommendation of the Association has been proposed both aerobic (cardio; exercises with the potential to improve heart respiration suitability) and resistance exercises (exercises with the potential to develop muscle, bone and soft tissue). In this context, the association is particularly focused on exercise prescriptions.

However, according to scientific data, the average residence time of modern world people is 7.7 hours / day. When the average sleep time of 8 hours is added to this sitting time, this rate reaches 15.7 hours. This is the highest time of inactivity recorded for all times. It is not possible to eliminate this level of inactivity that humanity has achieved with the exercise prescriptions mentioned above or to increase mobility with these strategies. The rational reason for this criticism is that an individual who sits or remains inactive for about 16 hours per day (approach 112 hours per week) is extremely inefficient in the effort to prevent inactivity with only 150 minutes of exercise per week. At this point, the association's exercise prescription should be understood as at least or at least as much

exercise should be done. Furthermore, another important point that should not be missed here is the confusion of exercise and physical activity. Exercise takes place within a program, usually in a specific area and in the presence of an instructor. It is very difficult to track exercise participation for a lifetime. Therefore, from my point of view, the modern world man must firstly organize his daily life. In this context, it should first develop a variety of strategies to increase the level of mobility within one day (24 hours). Or he (she) should develop theories of avoidance that will increase the level of inactivity. The rational reasons underlying this recommendation, especially strategies to increase mobility, can be sustained throughout life and thus a permanent habit will be gained in order to live healthier and more mobile.

Forming avoidance theories and combating inactivity are the most important options for me. I would like to emphasize the importance of avoiding with some other examples on this subject. For example, the most effective cleaning strategy is "Not Polluting". If you want to protect your health and live comfortably "Do not disturb your health first or improve it before your health deteriorates". As it can be understood from these examples, it is very valuable to form strategies that we can call avoidance or prevention. At this point, what are the avoidance theories that can be applied within the scope of prevention of inactivity? will be very helpful.

Practical Applications

Inactivity Prevention and Avoidance Theories

- As increasing the number of steps per day (first determine your number of steps and increase 1000 steps each week. Try to reach at least 10000 steps. Target 15000-20000 steps to achieve a better level).
- Change your daily step rhythm (try to walk roughly sometimes slowly, sometimes intermediate and sometimes faster steps, which will contribute to your heart breathing level).
- Take care to climb 60 stair steps daily, stop using the elevator to ensure this. You don't have to go up to very high floors. Do not stand on escalators as you climb the stairs.
- When you wake up in the morning, perform stretching and relaxation movements for at least 5 minutes (see examples of stretching and relaxation movements in the appendix).

- Trying to move for at least 3 minutes after every 30-minute sitting session during the day (examples of movement that you can do in the office or at home are attached). The mobility mentioned here is recommended to avoid the negative effects of sitting.
- Try not to sit for more than 2 hours at a time. Sitting during long sitting sessions and trying to prevent some of the negative effects of sitting (the appendix gives the sitting movements).
- You'll read something Try to do some of the reading activity at home or in the office, standing or walking (remember that many famous scientists have read and thought on foot or standing).
- Be sure to stand up at 1-hour intervals on long journeys and eliminate the negative effect of long sitting with small movements.
- Take care to use public transport. Because the modern world man is trying to use his own vehicle and effortless and easy to reach where he wants to go.

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Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

BRAIN HAEMODYNAMICS DURING STRENGTH EXERCISE

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The brain tends to receive optimal oxygen and glucose and is fed with 15% of the total cardiac output[1].Brain blood flow varies in different environmental status[2], disease[3] and especially in exercise condition[4] . According to what is known today, brain blood flow tends to decrease in low blood pressure[5], hypoxia[6], sleep[7] and cold[8], but increase during aerobic exercise[9].

The brain has self-regulation mechanisms to maintain suitable blood flow and oxygenation against fluctuations in systemic circulation. The most critical of these mechanisms are the formation of dilatation or constructions in the brain main artery, arteriol and capillary due to partial oxygen and carbon dioxide pressure changes in blood gases[1]. In neurogenic processes of cerebral vascularization, sudden flow in blood flow makes it more regular and linear flow.[10]

Neurovascular adaptation is frequently observed in the stimulated brain areas, and increased local blood flow during stimulation[11]. the brain being surrounded by the skull limits the increase in blood flow under the conditions of increase reported above

During exercise, metabolic activities in the brain increase. Because of these increases, O2 intake should be increased for aerobic continuity of activities. Usage of glucose increases at an exercise intensity of 60% of maximum oxygen consumption and continues for a while post exercise. In the process of increased contribute of anaerobic metabolism during exercise, the brain absorbs lactate[12].

Hyperventilation-induced hypocapnia with increased exercise intensity reduces blood flow, causing confusion in the motor area. There are claims that this process, which is defined as hypofrontality[13], may be the mechanism for ending exercise in case of exhaustion.

When the literature is examined, there are high number of studies on aerobic and anaerobic based exercise models. More research is needed in relation to strength training models.

Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
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(ICMFCE) 13-15 December 2019, İstanbul/TURKEY

Measurements of the brain hemodynamics during the strength exercise

The hemodynamic activity was evaluated via a functional near-infrared spectroscopy (fNIRS) device (fNIR Devices LLC, USA). This system has 4 light sources and 10 light detectors with a fixed source- detector separation of 2.5 cm. This configuration allows to monitor the activity with a total of 16 measurement locations (voxels) per wavelength. Data acquisition and visualization were conducted using COBI Studio software as previously described[15]. The system calculates the relative changes to the baseline values of oxy-hemoglobin (oxy-Hb) and deoxyhemoglobin (deoxy-Hb) molecules by using the modified Beer Lambert Law (pic 1.). The detailed information about the system and recording parameters can be found on Bediz et al 2015. The measurements in various exercise conditions have some pitfalls. The movement artifacts can be considered the one of the biggest limitations of these measurements. In the present preliminary study, we aimed to show the possible hemodynamic changes during isometric and isotonic exercises with the methodological approach. Three healthy young adults included to the study. None of them have any previous neurologic, psychiatric or chronic disease. All of them were informed and signed the informed consents before their attendances. They underwent to the two different exercise conditions, which were bench press and back squad exercises. Each exercise have both the isotonic and isometric parts. All of the participants came to the laboratory for two times with a 48 hours break. In the first visit, they filled the forms, gave the consents and attended to a test. In the second day, they attended to the other tests. In each day, the isometric part is the first part of the test and isotonic is the second part. For example; if a participant attended to the isometric part and isotonic part of the bench press in day one, he attended to the isometric part and isotonic part of the back squad in the second day or vice versa.

Picture 1. FNIRS device and optodes

Our pilot study data on strength exercise during isometric and isotonic phases

Experimental Protocol

The highest weight that the participants could lift in back squad and bench press movements was determined by applying 1 Repeat Maximum (1RM) test. The load of each participant corresponding to 40% of RM value was calculated individually.

All conditions and recording times were standardized between and within the participants. They always started with a 10 minutes warm-up exercise then attended to the isometric or isotonic exercises. All of the participants wore the fNIRS band. They started their isometric or isotonic exercise with a command from the experimenter and they ended their exercise period until they could not continue anymore.

During the isometric part of the bench press exercise, a load of 40% of the maximum voluntary contraction was applied to the participants the arms were straightened and the test was continued until exhaustion occurred. When they finished their part, they rested for 30 minutes. Then, they continued with the isotonic part of the exercise. In the isotonic part of the bench press exercise, they did the movements with 30 repetitions(1-1 rhythm) in one minute with a load of 40% of an RM. During the isometric part of the back squad exercise, the lower extremity was stabilized with a 90 degree angle. During the isotonic part of the back squad exercise, they repeated the movements 15 times in a minute. During the both exercises, the complete extensions and flexions were not included.

Picture 2. Prefrontal cortex oxygenation measurement during isometric bench exercise

Results

The hemodynamic parameters were averaged through the sessions. Then, we did average the three participants data among the sessions (figure 1). According to the preliminary results, the oxy-Hb raised during the all exercise conditions. With the limited number of participants, we could not apply any statistical methods. No significant difference was observed in dynamic and static phases in Back Squad exercise. On the other hand, there was a significant increase in brain oxyhemoglobin levels in the isometric phase in the Bench press exercise compared to the isotonic section.

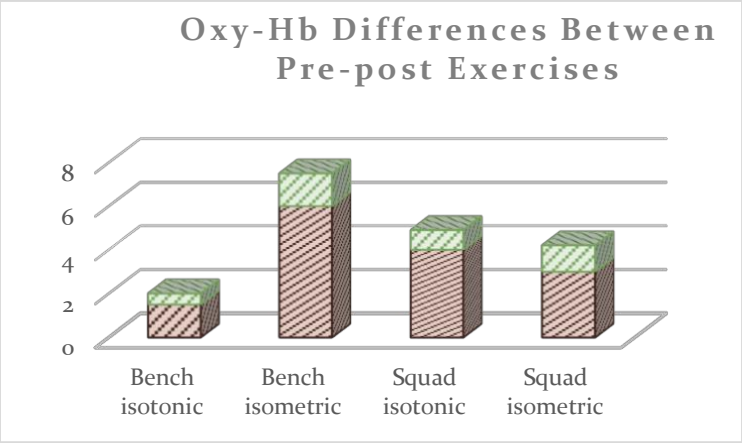

Figure 1. Oxyhemoglobin (oxy-Hb) delta values of isometric and isotonic exercise

Conclusion

Strength training can increase prefrontal cortex oxygenation. Isometric resistance exercise applications on the upper extremities may result in higher increases in hemodynamic responses. Alt ekstremitelerde ise izotonik egzersizlerde daha yüksek artışlar gerçekleşebilir. in our previously published research on'' How does isometric exercise affect the haemodynamics of brain? '' [16] has similar results.

It is considered that there is a need for higher number of participants and studies with different models in future researches.

ACKNOWLEDGEMENT

We thank Sarp Kırcı, Buğra Karakülah, Burak Acıkan, Ece Sunal for valuable contributions.

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Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

ORAL PRESENTATIONS

WHAT IS THE OPTIMAL POSITION FOR BENCH DIPS EXERCISE IN TERMS OF MUSCLE RECRUITMENT? – PILOT STUDY

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Introduction

Calisthenic exercises continuously increase in popularity. Many exercise participants tend to exercise with their own body weights. (Kotarsky et al., 2018). At this point of preference, there are some aspects that are attractive to individuals. The most important of these are easy accessibility, low cost and safe exercise practices. Bench dips training is one of the most commonly used movements among calisthenic applications. This exercise modality is generally applied to the triceps muscle group. This movement, which has many variations, may cause some changes in muscle activation values during different applications. At this point, electromyography applications, which are widely used in the field of sports sciences, provide the opportunity to quantitatively interpret the differences between different exercise applications (Martuscello et al., 2013). Optimal exercise practices can be determined by interpreting the activation values obtained after the measurement. Surface EMG is an easy to use as a noninvasive method. During the dips exercise, it is especially important to examine the muscles that act as the primary lifters as well as the muscles acting as secondary and synergistic. This is due to the decrease in the activation values of the basic lifting muscles, especially in exercise applications on unstable grounds, as well as an increase in the value of the secondary and synergistic muscles (Anderson et al., 2013). This increase is a desirable result in terms of co-activation, especially during therapy exercises. In addition, similar co-activation may be requested in individuals who are new to sports. The reason for this is to ensure that other muscles carry the burden, rather than one muscle acting as the basic lifter in a given movement. Therefore unstable ground exercises may be an advantage for the beginner in sport to ensure the distribution of the load between muscles.

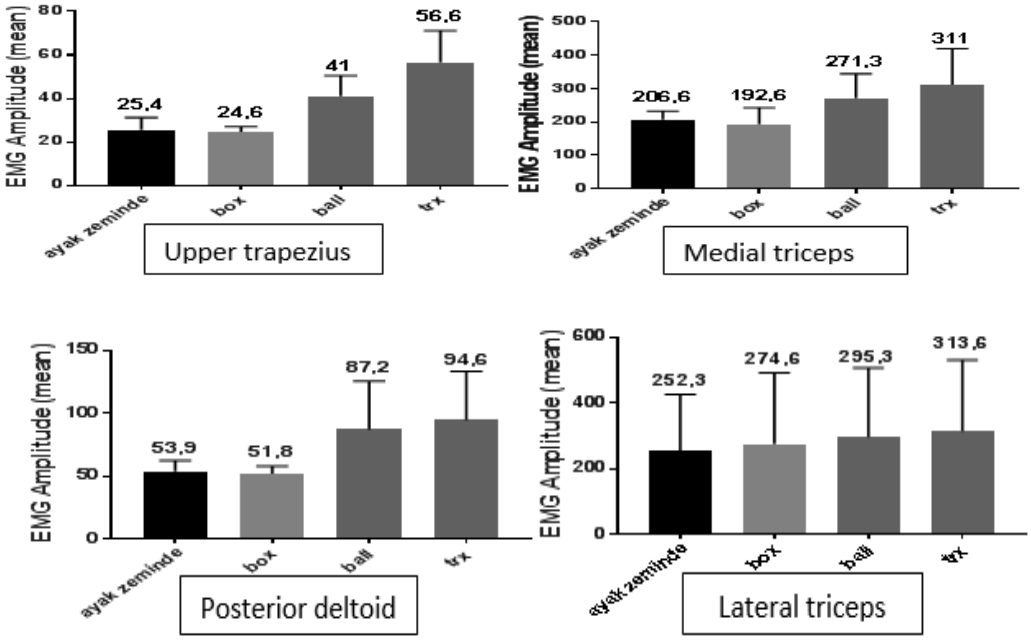
In this pilot study, bench dips exercises on 2 stable and 2 unstable grounds were examined. The aim of this study was to determine the activation values of the muscles determined during four different bench dips exercises.

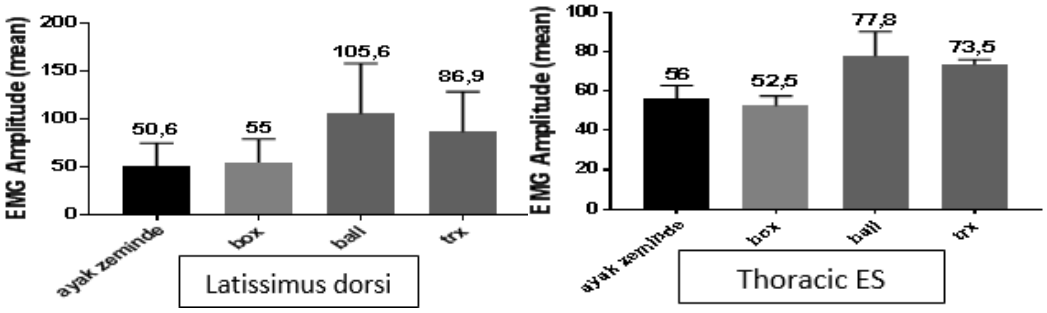
Method

The study group consisted of 3 male participants (age: 32 ± 41 years) with knowledge of body building and fitness practice. All of the bench dips exercises were performed with hands on the bench, feet on the floor, stability ball, suspension system and 30 cm high box. Metronome was used for standardization during movement. The exercises continued randomly during the application. Upper trapezius, lateral triceps, long triceps, posterior deltoid, latissimus dorsi and thoracic erector spinae muscles were examined. The 8-channel wireless system (Noraxon Desktop DTS) was used to obtain the raw data and the data were analyzed using MyoMuscle MR 3.10 clinical applications software. The findings were graphed using GraphPad-Prism.

Findings

The findings of the study were presented graphically.





Discussion And Conclusion

The results of the research showed that unstable ground exercises had higher muscle activation outcomes than stable ground exercises. These results were seen both for the muscles that act as the prime movers and for the synergist and secondary muscle groups. Bench dips exercise in terms of the prime mover triceps group in terms of the highest value was seen in the suspension system bench dips movement. The opportunity for quantitative interpretation of popular fitness movement patterns provides an opportunity to prepare a more conscious exercise plan. For exercise participants, activation values obtained during exercises performed for different purposes such as hypertrophic response or the inclusion of stabilizer muscles in motion can be interpreted as a usable resource for training efficiency. Bench dips exercise is generally applied to the triceps muscle group, but it also provides high participation of the deltoid and trapezius muscles. For maximum optimization of all these muscles, they can have distinct benefits when applied with different exercise materials. In particular, the inclusion of non-stationary ground exercises in training routines can provide both multifaceted development and holistic development of muscle groups rather than an isolated study.

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Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

INVESTIGATION OF ASCENDING-DESCENDING PHASES OF SOME SELECTED MUSCLES DURING BENT-OVER ROW EXERCISE

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Introduction

Scientists have often used electromyography (EMG) and surface electromyography (sEMG) to examine the magnitude of neuromuscular activation of muscles or muscles identified during any exercise movement (Edelburg, 2017; Carbonnier and Martinsson, 2012). The goal in the sEMG (Escamilla and Andrews, 2009), which helps to determine the timing and amount of muscle activation during a defined movement, provides us with information on improvements in the performance or efficiency of a movement, and the correct use of movement in terms of both muscle-saving and efficiency economy (Massó, 2010). One of the most important factors for sEMG to achieve its goal is to choose the right exercise (Fleck, 1999). Accordingly, Bent-over Row movement is often regarded as the basic exercise for posterior chain muscles by force-exercising.

Amateur and professional force workers exhibit bent-over row movement while muscular development for barbells, dumbbells, earthquake bars, tsunami bars, etc. as well as various bar grips such as supinated, pronated, alternate and hook grips. The rational mechanisms and possible differences of the ascending-descending phases of movement of this equipment choice and grip differences are among the most important issues. In this context, when literature is examined, there are very few studies on superficial electromyography (sEMG) activities of posterior chain muscles during bent-over row movement. During the bent-over row movement, ascending-descending phases of the action on the action potentials of the targeted muscles are discussed. To date, the question of how a change in muscle activity occurs during ascending-descending phases during bent-over row movement has not been answered. In this context, this aspect of the research is unique. This study aims to investigate the effect of movement during the ascending-descending phases of selected bar muscles during the bent-over row movement on the sEMG activity of selected muscles.

Aim

The aim of this study is to investigate the effect of movement on the sEMG activity of some muscles selected for ascending-descending phases during bent-over row movement.

Materials and Methods

Having the habit of regular exercise in research 17 healthy volunteers (age: 23.0 ± 3.9 years, height: 180.6 ± 7.09 cm, bm: 79.1 ± 8.30 kg, VIO: 15.15 ± 2.24%, BMI: 24.18 ± 7.71 kg / m2) were included. The volunteers were instructed not to participate in any strength exercise 48 hours before the start of the study. In addition, participants were instructed to maintain their daily habits such as daily nutrition and sleep patterns during the study. The study was approved by the local ethics committee. A three-week pilot study was performed before the study. Bent-over row motion was performed with 80% of 1 maximum repetition (1MT) with olympic bar. To standardize the trunk angle of movement; the metronome (60 bpm) was used to optimize the movement speed. Resting intervals were minimum 3 minutes. Muscles to measure sEMG activation identified [(Biceps Brachii (BB), Upper Trapezius (UT), Posterior Deltoid (PD), Lateral Triceps (LT), Latissimus Dorsi (LD), Longissimus (LG), Multifidus (MF)].

Prior to the measurements, all participants were subjected to a familiarization period at least twice a week for a total of 2 weeks in order to enhance the metronome and exercise display. Maxımum voluntary isometric contractions (MVIC) with 3 repetitions were determined separately for the muscles determined before starting bent-over row motion measurement. Afterwards, BB, UT, PD, LT, LD, LG, MF sEMG activities were evaluated during the bent-over row exercise. Electrode placement was performed according to SENIAM procedures. Before the electrodes are placed on each muscle, the skin; and by cleaning with isopropyl alcohol wipes. After skin preparations, circular bipolar Ag-AgCl surface electrodes (Noraxon Dual Electrodes, Noraxon USA, Scottsdale, Arizona; diameter, 1 cm; interelectrode distance, 2 cm) were placed on the dominant side of the subject. Raw sEMG signals were collected at a sampling rate of 1500 Hz using an 8-channel wireless telemetry system (Noraxon Desktop DTS) and analyzed by MyoMuscle MR 3.10 Clinical Applications software (Noraxon Telemyo, Noraxon USA, Scottsdale, Arizona). After video control and erroneous signal elimination, all sEMG crude signals were first permeable to the Butterworth band at 20-500 Hz and then filtered through a 100

ms time window with rms (mean root frame). The maximum value of the three rms-filtered MVIC signals is calculated for each muscle and each rms-filtered sEMG signal of bentover row activity is represented as% MVIC by dividing the rms-filtered sEMG activity by the MVIC value. The maximum value was used for each contraction in the analysis. In addition, all data obtained from bent-over row movements were normalized and presented as% MVC.

Statistical Analysis

All statistical analyzes were performed using IBM SPSS 17 package program. The homogeneity of the research data was tested with ‘‘Shapiro Wilk’s’’ test since the number of volunteers was less than 50. Paired Samples T Test was used to analyze two different parameters of a group. Significance level was used as $p < 0.05$.

Findings

As a result of the study, in terms of ascending-descending phases of movement during olympic bar bent-over row movement, BB (31% and 46% respectively), UT (65% and 69% respectively), PD (62% and 82% respectively), LT (40% and 60% respectively) and LD (61 and 70% respectively) in the sEMG activities of muscle groups in favor of descending phases were statistically significant ($p < 0.05$). However, there was a statistically significant difference in favor of ascending phases in sEMG activities of LG (56% and 50% respectively) and MF (51% and 43% respectively) muscle groups ($p < 0.05$). In other words, the sEMG activity of the BB, UT, PD, LT and LD muscles during the olympic bar bent over row movement was found to be higher in the increasing phase, while the LG and MF muscles had higher sEMG activity in the descending phase.

Discussion

The most remarkable finding obtained from the study was that PD (82%) muscle had the highest sEMG activity during the descending phase during olympic bar bent over row movement. On the other hand, the highest sEMG activity in terms of ascending phase was measured in UT (65%) muscle. Furthermore, another striking finding was that increased phase during bent over row movement had higher sEMG muscle activity in LG and MF muscles than descending phase, but ascending phase UT, PD and LD muscles produced higher sEMG muscle activity. At this point, the findings of the research provide unique contributions to the literature. Dunnick et al. (2015) examined the effects of a fixed and mobile load on muscle activation with 60 and 80% of 1 maximum repetition during

bench press, all muscles show significantly greater activation during the concentric phase compared to the eccentric phase at 80% compared to 60% load. This shows that our study is parallel with the literature and therefore our study supports the literature.

Result

In the light of the findings obtained, the hypothesis (H_0) determined for all the muscles measured was rejected. That is, there was a difference in sEMG activity of all muscles during phases of bent-over row movement. In other words, it was determined that BB, UT, PD, LT and LD muscles had higher sEMG activity in increasing phase and LG and MF muscles had higher sEMG activity in terms of ascending-descending phases of movement during olympic bar bent-over row movement.

This study was supported by Inönü University Scientific Research Projects Coordination Unit with TDK-2018-1444.

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Journal of Athletic Performance and Nutrition
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EFFECT OF AEROBIC EXERCISES ON BODY COMPOSITION AND SOME BLOOD VALUES IN ADOLESCENT WOMEN

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Introduction

The fact that present technologies allow the daily work to be done with some tools has caused to decrease the movements of individuals. However, it also provided an opportunity for individuals to engage in activities in their spare time. But many people prefer to live still. The human body is organized in such a way that it can move and perform challenging physical activities. Even so, exercising is not one of the daily activities of an average lifestyle.

By making their static lives active can individuals cope with their physical and psychological problems and become healthier. Exercise plays an important role in combating cardiovascular disorders, obesity and musculoskeletal disorders.

Determining the right exercise program is as important as exercising. Exercise programs should be individually planned and tailored to meet the needs. Energy (XE Energy) balance is influenced by energy expenditure that is a product of exercise. Energy expenditure resulting from physical activity is the most effective and important factor that stimulates energy release (3).

People should gain the habit of healthy nutrition and physical activity for a better quality of life, to improve their health, to maintain their development and to improve their life (4). Knowing energy consumption is important to prevent the negative effects of static lifestyle and to associate physical activity with health (5-6). In order to achieve this goal in the shortest way, we need to know our daily energy needs. The minimum amount of energy required to maintain one's vital functions is called basal metabolism (1-7).

Material and Method

For this study, 24 volunteer female students between the ages of 14-17 participated, who study in Istanbul Küçükköy Girls' Vocational and Technical Anatolian High School, (Gaziosmanpaşa, Istanbul) and don’t have any health problems.

As the first stage of the selection of the participants, posters that providing information about the prerequisites and functions of the study were used in Küçükköy Girls' Vocational and Technical Anatolian High School Sports Hall (XE "Sport") and other boards of the school. Among the participants reached with the help of this banner, which stated that the study included 14-17 years old women who had not done sports before, body fat percentages after measurement and BFP values between 23-35% were preferred. Afterwards, those who could participate in the exercises regularly for the duration of the study were asked to complete a volunteer participation form and a form confirming their parents' participation in the study. Twelve participants were separated into two group as exercise group (EG)and control group (CG). Before the study, all participants were interviewed and all necessary information about the research was clearly explained with the witness. In addition, participants' participation and withdrawal criteria are as follows.

The participants who participated in aerobic exercise applications were given aerobic exercise program with karvonen method for the first 3 weeks at 60%, second 3 weeks at 65% and last 3 weeks at 70% intensity (moderate) for 9 weeks and 3 days a week for 1.5 hours. Each of exercise period consists of 5-10 minutes of warm-up, 50 minutes of main stage and 5 minutes of cool down and stretching. Exercise takes 90 minute. During the exercising were used elliptical bicycle and treadmill. The aerobic exercise intensity of the group was regulated every 2 weeks by controlling the heart rate.

Data Analysis

Statistical analysis was performed with SPSS 17.0 package program. The Statistical process were first started with hypothesis testing and test of homogeneity of variances. Because of the sample size was less than 50, "Shapiro Wilk" test was applied on homogeneity tests. After determining that the variances showed homogeneous distribution, "Independent Student T" test was used to test the level of significance between two independent variables. In order to determine the pre-test and post-test differences of the groups, " Paired Samples T" test was performed. Level of significance was accepted as 0.05.

Results

The mean BFP difference of the CG participants before and after exercise was 1.553 ± .7308, while the mean BFP difference of the EG participants was -2.986 ± 1.098. While the mean BFP of the CG participants increased, the mean BFP of the EG participants

decreased. It was seen that there was a statistically significant difference in BFP values of EG and CG participants in favor of EG participants (p=.000).

While the mean BMI differences of the CG participants before and after exercise were 1.410 ± .4660, it was observed that the mean BMI differences of the EG participants were -1.431 ± .5638. While the mean BMI of the CG participants increased, the BMI of the EG participants decreased. It was found that there was a statistically significant difference in BMI values of EG and CG participants in favor of EG participants. (p=.000).

While the mean Cholesterol differences of the CG participants before and after exercise were 1.733±21.224, it was seen that the mean Cholesterol differences of the EG participants were -4.533±22.503. Cholesterol values of CG and EG participants were found to be decreased. There was no statistically significant difference between EG and CG participants' cholesterol values (p = .750).

While the mean Glucose differences of the CG participants before and after exercise were 7.266±13.910 it was seen that the mean Glucose differences of the EG participants were -5.533±9.372. While the mean Glucose of CG participants increased, EG participants decreased. It was found that there was a statistically significant difference in the glucose values of EG and CG participants in favor of EG participants (p=.016).

Discussion

In the field of physical mobility, from the past to the present, many types of exercise, Functionality adding to life project and various types of activities for healthy living have been investigated. Nowadays, many scientific researches were carried out in accordance with the innovations brought by modern life and technology and it carry out.

In the study; Measurements of body weight (BW), body mass index (BMI) and body fat percentage (BMP) values were provided with the information indicated in the literature and the data supporting and not supporting each other. In the EG, there was a significant decrease in BW, a significant decrease in BMI and a significant decrease in BMP. There was a significant decrease in glucose values as blood values in favor of the EG ($p<0.05$). There were also decrease LDL, HDL, Triglyceride and Cholesterol values. However, there was no statistically significant ($p>0.05$). In the CG, an increase was observed in BW, BMI and BMP in terms of pre-test and post-test values. ıt was observed that there is no significant difference in blood, waist circumference and hip circumference values in terms of CG ($p>0.05$).

Babayiğit et al. (2002) reported that sedentary women aged 25–32 years experienced a decrease in body weight as a result of an 8-week, 3-day, moderate 45-minute step program (9).

Amano et al. (2001) reported that as a result of aerobic exercise applied to obese men and women, body fat percentage of the subjects was 29.6 ± 1.3% before exercise and 26.6 ± 1.3% after exercise and a significant decrease was found compared to pre-exercise (8).

It is observed that our study has similarities with some of the studies shown as examples above and there are differences with some studies. The observed differences are thought to be due to differences in the group applied, age applied, types of exercise applied, and time applied.

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Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

HIIT AND HIIRT EXERCISE MODALITY DIFFERENCES

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Introduction

In recent years, as a current problematic, the rational cause of strength or endurance training has been discussed. Exercise modality differences can cause many effects or molecular responses. In this context, scientists, exercise professionals and coaches have constantly sought new methods of exercise to develop strategies to optimize and maximize the performance of athletes in shorter periods, as well as to improve the health-related parameters of sedentaries. (Issurin, 2010). Especially in recent years, different exercise methods have been proposed and reached a wide variety. In this context, HIIT (High intensive interval training) programs can provide positive adaptation for both sedentary and athletes and can make positive contributions to health and performance. HIIT programs are less costly and more efficient when compared to traditional aerobic exercise programs. HIIT programs have also increased in popularity due to their different forms and have recently emerged as the most preferred training strategy (Bayati et al., 2011; Samuel et al., 2013; Akgül et al., 2017). However, the HIIRT (High intensive interval resistance training) approach has also been proposed, with some features similar to HIIT. Both physiological and health related parameters of HIIRT programs were tried to be explained.

In this sense, the aim of this study is to explain the differences between HIIT and HIIRT exercise modalities. Moreover, to provide scientific information to interested sports professionals, athletes, recreational athletes and coaches.

What is HIIT (High Intensity Interval Training)?

HIIT is a widely preferred exercise modality today. HIIT modalities are often preferred because they have the potential to generate more metabolic costs in a short period of time and have different work-rest rates. Since HIIT became popular in the 2000s, it has been a topic of interest for both exercise professionals and in the academic field. HIIT modality is used for loading at maximal (peak) oxygen uptake level with relatively short resting intervals. Loading times can last from 3-5 seconds to several minutes, followed by a few minutes of rest (Gibala and McGee 2008). HIIT is physiologically more effective than moderately continuous studies, despite shortness of time and total exercise time

(Buchheit and Laursen, 2013). HIIT has positive effects on aerobic and anaerobic fitness, blood pressure, cardiovascular health, insulin sensitivity, cholesterol profiles, muscle mass maintenance and body weight reduction. One of the first examples of HIIT methods is wingate style. Apart from Wingate style, HIIT styles are available such as Bicycle ergometry, Tabata style, Gibala Style, Timmon Style, Running training (Bayati et al., 2011).

Possible mechanisms of HIIT

The possible mechanism of action of the HIIT modality is shown to be increased mitochondrial enzyme increases and increased aerobic energy potential of high density loads (Gibala and McGee 2008; Ross and Leveritt, 2001). Moreover, it has been reported that administration of HIIT modality over a period of time (4-6 weeks) has effects on both skeletal muscle protein content and glucose and free fatty acid transport and oxidation. In this context, HIIT modality is thought to have significant effect potential in terms of regulation, transcription and stimulation of fats and proteins (Burgomaster et al., 2008). The most striking effect of HIIT modalities is the upregulation potential of oxidative metabolism. Oxidative metabolism upregulation is a precursor to endurance adaptation. In this context, the initiator of oxidative metabolism upregulation is the PGC-1α (the peroxisome proliferator-activated receptor gamma coactivator 1 alpha) receptor. PGC-1α receptor provides coordination of mitochondrial biogenesis (Baar, 2004). Activation of PGC-1α receptor increases ATP production. With the increase of PGC-1α, the effect of MRNA in the mitochondria increases, thus accelerating the mitochondrial adaptation time. Activation of the PGC-1α receptor has been shown to be directly related to exercise intensity. HIIT modality stimulates this receptor more than endurance training. HIIT modality increases the activation of this receptor in mitochondria and enables more energy to be produced. This increases skeletal muscle oxidation capacity and improves maximal activity level (Gibala, 2007; Gibala and McGee, 2008; Gibala et al., 2012).

What is HIIRT (High Intensity Interval Resistance Training)?

HIIRT developed by utilizing the techniques used by bodybuilders. HIIRT modality includes short rest intervals between sets and allows the use of high loads. However, it is a progressive resistance training program in which the muscle is exposed to tension. HIIRT is similar to HIIT because it includes short bursts of high intensity exercises with maximum effort and heart rate. However, HIIRT includes compound, multi-joint

muscle group exercises as opposed to strictly endurance-focused exercises such as walking, running, sprinting or cycling. This exercise program aims to increase both aerobic and anaerobic training modes, cardiorespiratory fitness, muscle strength, muscle endurance, muscle strength and functional performance (Paoli et al., 2012; Moro, 2015; Moro et al., 2014; Madden, 2018; Caserotti, 2010). HIRT exercises usually begin at 70-89% of the maximum of 1 repetition at the beginning (Raymond et al., 2013). HIIRT can provide significant functional benefits and improvement in overall health and well-being (Shaw, 2008; 2014).

Possible mechanisms of HIIRT

HIIRT modality deep motor units are highly stimulated. Thus, maximum muscle phosphate depletion can be provided. It also triggers a greater testosterone secretion and partly secretion of GH (Kraemer et al., 1990). This modality can be defined as an intermittent training with weights where the energy system used is anaerobic alattacid. HIIRT modality can be considered an excellent technique to increase power as it excites a large number of motor units. It can also stimulate hypertrophy because it triggers anabolic hormones. Moreover, it can be used as a method for weight loss. Numerous intracellular signaling pathways have been identified in the skeletal muscle and indicated to be important for mechanically induced hypertrophic adaptation. In this sense, HIIRT modality can trigger some important hypertrophic signaling pathways such as Phosphatidylinositol 3-kinase (PI3K/Akt) Pathway, Mitogen-Activated Protein Kinase (MAPK) Pathway, AMP-activated protein kinase (AMPK) pathway (Moro, 2015). However, skeletal muscle mass is regulated by mechanical stress signals that control protein synthesis and degradation. STARS (the striated activator of rho-signaling) is a specific muscle protein associated with actin that is sensitive to extracellular stress. One of the functions of STARS is to stimulate actin by affecting the transcription of SRF (the serum response factor) and PGC-1 α, which are involved in muscle growth and contraction. There is evidence that SRF and PGC-1a are activated by the HIIRT modality (Moro, 2015).

When we look at the studies carried out on the subject in the literature, especially the studies comparing HIIT and HIIRT protocols according to various variables are quite limited. In this sense, in a study conducted especially on overweight and obese women participants, the physical properties of HIIT and HIIRT protocols and their effects on cardio-metabolic health were tried to be explained. According to the findings of the study,

individuals included in both HIIT and HIIRT training protocols improved their aerobic fitness compared to the control group. However, a significant increase in upper body strength was noted in HIIRT group (Alan, 2018). In another study conducted in the literature, Madden (2018) compared the effectiveness of HIIT and HIRT exercise modalities with moderate intensive continuous (MICE) in elderly adults at risk of chronic disease. VO_{2max} was similarly developed in all groups. Functional movement screen (FMS) improved both high intensity groups, while time up and go (TUG) and balance improved only in the HIRT group. Wingfield et al. (2015) examined the effect of exercise modality and pre-exercise carbohydrate (CHO) or protein (PRO) ingestion on post-exercise resting energy expenditure (REE) and respiratory exchange ratio (RER) in women. 20 recreational active women participated in the study. Each participant completed six exercise sessions, consisting of three exercise modalities: aerobic endurance exercise (AEE), high-intensity interval running, and high-intensity resistance training; and two acute nutritional interventions: CHO and PRO. As a result of the research, HIIT revealed the largest increase in post-exercise energy expenditure. HIIT resulted in the largest reduction in post-exercise RER, increasing fat oxidation, compared to AEE and HIRT. In combination with varying exercise modalities, PRO intake elevated post-exercise REE and fat oxidation (via RER) to a greater extent than CHO. Researchers have reported that integrating HIIT and pre-exercise PRO intake into exercise routines for women may have positive effects on weight and body composition. Paoli et al., (2012) tested the acute effects of high intensity intermittent resistance training and traditional resistance training (TT) on REE and respiratory rate (RR) at 22 hours post-exercise. In two separate sessions, seventeen trained males carried out HIIRT and TT protocols. As a result, researchers reported that high-intensity intermittent resistance training significantly increased post-exercise excessive energy consumption more than traditional resistance training. At the same time, researchers have reported that HIIRT methodology has positive effects on improving metabolism, muscle mass and strength.

HIIT and HIIRT: The Points to be Considered

In recent years, both HIIT and HIIRT have different perspectives on the possible mechanisms and possible effects of training philosophy. The main reason for these different perspectives is the fact that the modalities are in high limits and the main point of criticism. It is controversial for whom HIIT and HIIRT training modality is suitable for

exercise participation. In particular, it is a common point that inexperienced or new exercise participants should not exercise within these limits. It is more suitable for HIIT and HIIRT modality of experienced or professional persons. For these reasons, the prerequisites for participation in training must be determined before HIIT and HIIRT are applied. It is known that the exercises performed by individual trainers in our country and in the world result in disability or even death. Therefore, attention should be paid to programming these exercise modalities. Coaches must also be qualified and experienced in relation to this exercise method. Moreover, it is expected that the fitness level of the individuals who will apply these exercise modalities will be good.

Conclusion

HIIT and HIIRT modalities may contribute to the remodalization and molecular regulation of skeletal muscle. Mitochondrial phenotype changes caused by HIIT and HIIRT modalities may activate signaling pathways such as PGC-1 α, MAPK, AMPK and p38. Another remarkable mechanism of action of HIIT and HIIRT modalities is energy metabolism. In other words, modalities can affect factors that directly affect mitochondrial function, such as blood glucose level regulation, GLUT4 receptor transition, and oxidation of fatty acids. In addition, HIIRT method can be seen as a more effective strategy in terms of muscle strength development and stimulation of hypertrophy.

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Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

IS THE WHAT EFFECTIVE USE OF TIBIAL TUBEROSITY FOR STEP TESTS IN DETERMINING VO2MAX?

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Introduction

Vo2max, which is the basis of the study, is an important approach used in the field of sports and health. This approach, which is used for many purposes, is now widely used by sports scientists, coaches and medical professionals to determine total fitness levels of individuals. When we examine the origin of the concept of Vo2 max, Archibald Vivian Hill, Antoine Lavoisier, Edward Smith, Christian Bohr, August Krogh, Astrant and many scientists have taken a theoretical basis with the work they have played a role in becoming today (Arlene et al., 2004). Vo2 max, which we may encounter with many definitions in the literature, is described as "the highest amount of oxygen consumed by the body during exercise" (Kafkas, 2019). With this definition, it can actually be used to determine the functions of both cardiovascular and pulmonary system and skeletal muscle system factors. In other words, it is the best measure of cardiorespiratory fitness, although it determines how much oxygen your heart can pump and how much oxygen your skeletal muscles can use. VO2max is a reflection of total body health. Thus, it is an important health indicator for both sedentaries and athletes.

Today, many methods are used in Vo2max determination. We can examine them in two different groups as maximal and submaximal Vo2 max measurement methods. In the determination of Vo2max, bicycle ergometer tests, treadmill tests, step tests and field tests are used (Kraemer et al., 2011). Numerous indirect methods have been proposed to assess the cardiorespiratory fitness status, since the determination of Vo2max requires a fairly comprehensive laboratory and is not practical for testing large groups of sedentary participants. Submaximal methods have been introduced especially for sedentaries and safer results have been tried to be obtained. Queens college step test, which is one of these methods, is a popular protocol used for determination of vo2max since it is a safe and low risk test for both applicability and sedentaries. The Queens college step test that we examined in our study was put forward by Mcardle in 1972. The test is continued for 3 min with a 96/88 metronome on a 16.25 inch / 41.3 cm high box. The individual's Vo2max

degree is obtained by passing the pulse obtained at the end of 3 min through formalization (McArdle, 1972).

The important point for us here is whether the Queens college step test is reliable. If we examine this issue a little more; each individual is different. Differences in both anthropometric characteristics and body proportion may be essential examples of this. What draws our attention here is the length of individuals. For example, an individual with a height of 190 and an individual with a height of 160 perform the test on a 41.3 cm high box. This raises concerns for accurate Vo2max determination among individuals. Therefore, since there are differences in proportions in individuals, two individuals with a length of 180 will not give us an accurate result when they perform the test. That is, two people with a length of 180 cm may not have the same body and leg length. Therefore, in this test where leg length is advantageous, height of individuals will not give clear results. Therefore, the most important evaluation point for us is the length of the tibial tuberosity.

If we talk about tibial tuberosity; tibia is located below the anterio surface of the condyle, just below a large mound. The patellar ligament and the tendon of the quadriceps femoris muscles end at the tibial tuberity. But the important point for us rather than them is that hip flexion occurs at approximately these levels in high-speed runners according to running mechanics (Cook et al., 2014). Therefore, it is of interest to determine the length of Tibial tuberosity of individuals and to index the length of the box and whether this conduction of the test is effective in determining Vo2 max. When the national and international studies on this subject were examined in all aspects, limited research was found on this subject. In terms of performance measurement, this study was needed because of its contribution to the literature in both health and sports.

Method

Participant group

The participants of the study consisted of 9 volunteers (2 females / 7 males) who were students and academic staff of Inönü University Faculty of Sport Sciences between the ages of 20-40.

Means of data collection

Length measurements

A wall scale with a sensitivity of 0.1 cm was used to measure the height of the participants. The athletes' feet were bare or the measurement was made with socks whose

thickness could be ignored. During this measurement, it was ensured that there was no object at the beginning of the athletes that would affect the measurement. While taking measurements, the body and head are upright, the soles of the feet are on the ground and adjacent to the scale, arms are freely hanging from side to side. Under these conditions, the length value on the scale was read. The obtained value was recorded with a sensitivity of 0.1 cm (Özer, 1993).

Weight measurements

Tanita device with a sensitivity of 0.5 kg was used for this measurement. There were no clothing that would affect the weight of the athletes. The athletes stood on the scale, looking upright, and the reading was recorded in kg (Özer, 1993). Body Mass Index (BMI) values, BMI = Weight (kg) / (Height) ² was determined by the formula (Zorba and Ziyagil, 1995; Tamer, 2000).

Skinfold / Diameter-circumference measurements

Skinfold measurements of the participants were performed on an empty stomach in the morning. Skinfold measurements were made from 8 different regions. These points; chest, midaxillary, triceps, subscapular, suprailiac, thigh, gastrocnemius and abdominal regions. Diameter circumference measurement points; biceps perimeter, gastro perimeter, hip perimeter, waist perimeter, humeral bicondylar and femoral bicondylar. Skinfold and diameter perimeter measurement procedures were determined before measurements and all measurements were made according to this procedure.

Queens college step test measurements

Queens college step test measurement was applied to participants in 2 different protocols at different times. A break of at least 4 days was taken between the two tests. Metronome, polar clock, stopwatch and tape measure were used in all measurements. All participants were given an information form before the test and emphasized the parameters to be considered before the test.

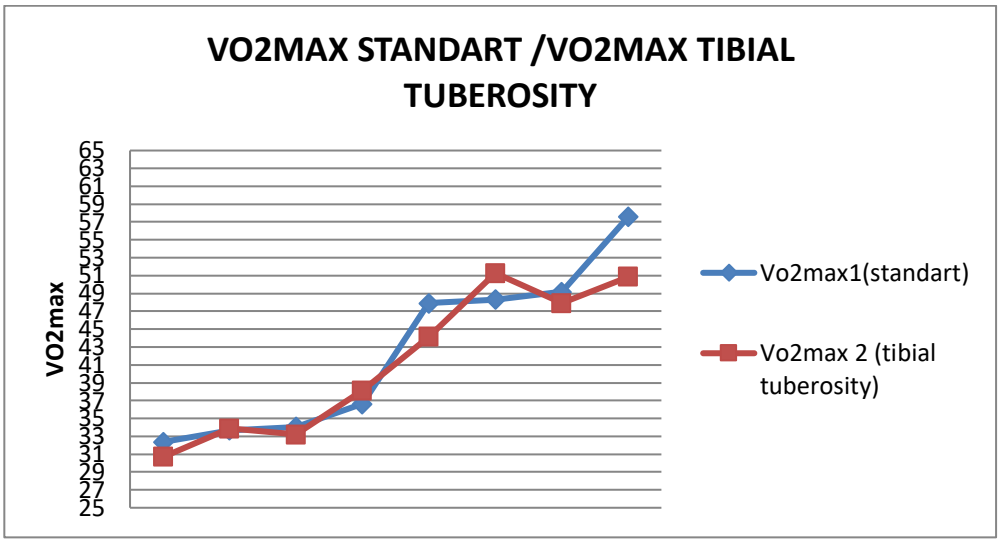
For all measurements, the pulse interval was recorded with the polar clock 5 seconds after the end of the test. Before the test, all individuals were given a warm-up interval of 5 minutes and a 3-minute stretching interval. The participant started the test with rest. Before the test, the protocol was explained to the participant and a 15 sec acclimation phase was performed (McArdle, 1972).

The first measurements were made according to the standard Queens college step test protocol. According to this, the male participants performed the test with 96 metronomes and the female participants with 88 metronomes on a 41.3 cm high case for 3 minutes.

In the second measurements, the length of the tibial tuberosity in cm starting from the soles of the participants was recorded. As a result of the data obtained, the height of the box was adjusted to be equal to the tibial tuberosity length of the individual. Participants performed the box height test indexed by tibial tuberosity length with 96/88 metronome for 3 minutes.

Results

The findings of the study were presented graphically.



Graph 1. Comparison of Tibial Tuberosity with Standard Step Test

When the graph 1 was examined, it was seen that the standard QCS test and the repeated step test results were similar based on the tibial tuberosity height of the participants ($p > 0.05$). In other words, there was no difference between the box size (41.25 cm) used as standard for the QCS test and the step size test set for the tibial tuberosity lengths measured for each of the participants.

Discussion and Conclusion

In the study findings, 7 subjects were excluded because of high distribution. The results of the research showed that similar results were obtained between standard queen's

college step test protocol and tibial tuberosity protocol. The study will be continued by increasing the measurement population for clearer results.

In the literature review on the subject, limited studies were found. In the study conducted by Shamsi M et al. (2011), it was aimed to determine the relationship between height and Vo2max of Queen's College Step Test. In this study, 54 female university students were divided into three groups as Short (153.22 ± 3.11cm), medium (161.27 ± 1.77cm) and high (171.91 ± 3.17cm) height. CET). In the results of working; The VO 2Max values measured by QCT and CET were found to be significantly different (P≤0.05). However, the differences between VO 2Max values measured directly by CET and indirectly estimated by QCT in all three groups were found to be statistically insignificant (P> 0.05). In all three groups, VO2Max values measured by QCT were higher than VO2Max values measured by CET and there was no statistically significant relationship between height and VO2Max values in all participants (P> 0.05). It was concluded that there was no relationship between height measured by two different tests and maximum oxygen uptake (VO2Max); There was no statistically significant relationship between height and VO2Max values in all participants (P> 0.05). In parallel, Chatterjee S et al. (2004) in their study aimed to evaluate the suitability of Queen's College step test (QCT) test to predict maximum oxygen uptake in Indian men. The results were compared on 30 male students both by direct measurement (bicycle ergonometry) and indirect measurement (queens college step test). The study as a result of direct measurement (VO2max = 39.8 (1.03) mL / min / kg body mass) and indirectly estimated average (SD) difference between the values of VO2max (PVO2max = 39.3 (1.07) mL / min / kg body mass) are not statistically significant (p > 0.10). Similarly, Prabha, et al., (2009) study conducted by Queen's College step test in young male subjects(QCT) Test and treadmill Jogging (TMJ) maximum oxygen uptake (VO2max) in young male subjects obtained by two different indirect methods to estimate and by comparing these two methods are equivalent and are intended to determine whether VO2max. According to the results of the tests performed on 60 participants; While VO2max QCT and VO2max TMJ showed similar trends in estimated VO2max values, both methods showed a significant correlation with each other (r = 0.94 p <0.001). However, it was found that VO2max determined by TMJ gives higher values than QCT VO2max values.

Recommendations of the study;

More reliable and valid results can be obtained by increasing the group of participants. The Vo2max values obtained from the study can be compared with the real-time direct method K4B2. However, it can be compared with different Vo2max techniques. At the same time, a new protocol can be determined by changing the metronome and time. However, it can be associated with the individual's exercise history. New norms can be set if required. In addition, the effect of changing the foot every 1 min at the time of measurement can be compared.

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Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

IMPORTANCE OF STEP HEIGHT IN VO2MAX DETERMINATION (PILOT STUDY)

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Introduction

Maximal aerobic capacity (VO2max) is a strong criterion of health and fitness and is considered an important physiological measure in healthy adult populations. VO2max refers to the intensity of the aerobic process and actually indicates the maximum capacity to carry and use oxygen during exercise with increasing intensity. VO2max is the highest rate of oxygen consumption that can be achieved during maximum exercise (Rancovic et al., 2010). Maximum oxygen uptake as a measure of aerobic capacity has been determined as the international standard of physical activity (Bowers, 1988). The basic unit for measuring maximum oxygen uptake is the absolute value expressed in liters or milliliters per minute. However, the absolute value is highly influenced by body weight; therefore it is generally expressed in milliliters / kg / min. Decrease in physical activity affects body composition factors such as body fat percentage, body mass index, and body muscle mass. There are close relationships between body composition factors and aerobic, cardiovascular fitness. Aerobic fitness increases with a decrease in body obesity (Brooks, 2002).

Physical capacity is usually assessed by maximal or submaximal exercise tests. Although maximal exercise testing is considered the gold standard for assessing maximum aerobic capacity, the role of such tests may limit performance due to pain or fatigue rather than exertion. Submaximal tests have been developed to meet the needs of people with various functional limitations, people with disabilities and older adults. Submaximal exercise tests show greater applicability compared to maximal exercise tests. The submaximal exercise test overcomes most of the limitations of the maximum exercise test and is a preferred method in cases of physical and physical pain and fatigue. The objective of the test should be to produce sufficient exercise stress without physiological or biomechanical strain (Noonan and Dean, 2000).

Queens College step test, a submaximal exercise test; is one of many step test procedures used to determine aerobic fitness. McArdle et al. Developed a 3-minute step

test to assess aerobic fitness on 41 university women. Test-re test reliability was found to be r = 0.92 and r = -0.75 correlation between VO2max and pulse rate during rest period. McArdle and Katch changed the test for men in college to 22 steps per minute for men and increased the descent to 24 steps per minute. This test, which is performed in a 41.26 cm case size, calculates the VO2max of the person by finding the heart rate between 5 and 20 seconds immediately after the end of the test (Arcdle and Katch, 1972). Apart from the normal procedure, it may be a different method to measure a person's aerobic fitness, since pulling down the muscle neck will reduce physiological and biomechanical strain and also increase knee joint pain. In a study, it was concluded that the knee joint angle was 60 degrees in the normal procedure and that it had a 90 degree angle in the 30 cm muscle length, and that the exercise test performed at a 90 degree angle could reduce fatigue and eliminate the lower extremity muscle strength factor (Sopalard et al., 2016). Therefore, the aim of the study; The modernization of the Queens College step test, which is a submaximal aerobic fitness determination method, is to reduce the physiological and biomechanical stress by pulling down the muscle size and formulate the formula according to this procedure.

Methods

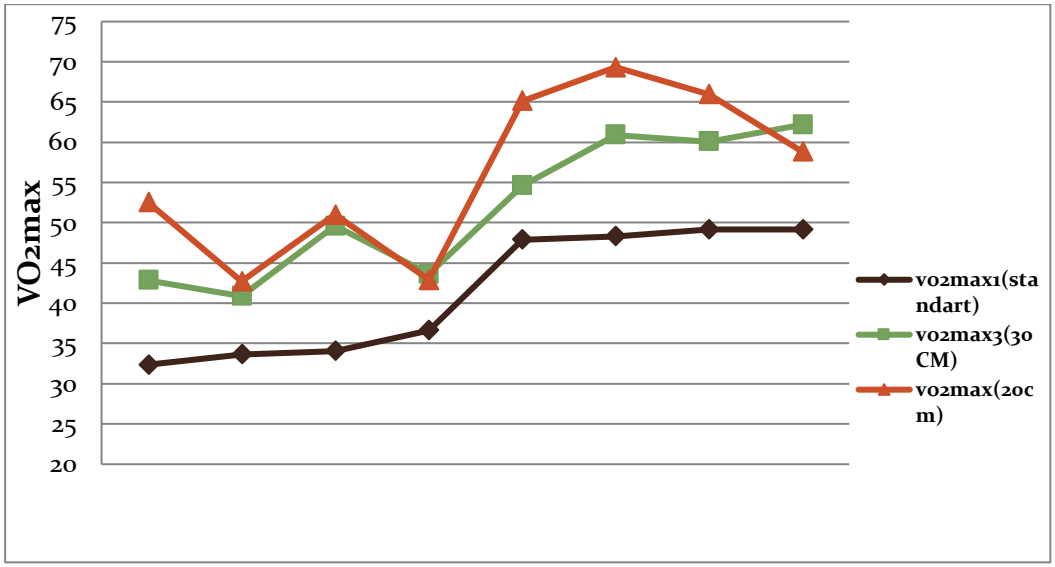
The study group consisted of 9 adult and 2 healthy, 2 female and 7 male participants. Anthropometric measurements (Saehan skinfold caliper with Tanita SC 330 body analyzer) were performed. Participants on a different day After 3 minutes of aerobic running and 2 minutes of dynamic stretching, the 41.26 cm tall men went up and down into a crate fixed to the floor with 22 steps per minute and women at 24 steps per minute. At 3-day rest intervals, they climbed up and down a casing of 30 cm length and 20 cm length, respectively. The heart rate of the participants was recorded with Polar watch 5 seconds after the end of the test 20 seconds before.

Results

The findings of the study were presented graphically.

Based on 41.26 cm normal procedure; The deltas of the results obtained from the tests with 30 cm and 20 cm muscle lengths were calculated.

For 30 cm case; Δ: 25% for the 20 cm case; Δ: 35% were found.



Discussion and Conclusion

Some health problems can arise when testing people with a wide variety of conditions, including cardiovascular and cardiopulmonary conditions that are life-threatening. Even people without known health problems can give unexpected answers. Therefore, the production and application of submaximal exercise tests, which will produce sufficient exercise stress without excessive physiological and biomechanical strain, is important for the fitness world. For this reason, it may be more accurate to re-formulate the muscle length applied in QCT test by 20 or 30 cm and re-formulate it according to 41.26 cm body size. As a result; On the basis of the graph, VO2max does not show a normal distribution at 20 cm muscle size, and the normal distribution is seen only at 30 cm muscle size. The 30 cm muscle length test produced 25% less exercise stress than the 41.26 cm muscle length test, which was 35% for the 20 cm muscle length. Therefore, the protocol with a 30 cm muscle length can be tested in different populations and the formula of the normal procedure can be integrated into this protocol, thus reducing the physiological and biomechanical strain and increasing the knee joint angle.

Modernized step tests may be needed to measure VO2max for people with musculoskeletal limitations, poor balance, overweight, and not able to walk on the treadmill, and such studies can be tested in different populations.

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Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

EFFECT OF DIFFERENT PHYSICAL THERAPY METHODS ON PAIN, PHYSICAL FUNCTION AND QUALITY OF LIFE IN PATIENTS WITH KNEE OSTEOARTHRITIS

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Knee joint is the most commonly affected joint between peripheral joints of osteoarthritis (OA). There is no treatment method that completely reverses or prevents disease by eliminating changes in cartilage loss and new bone formation in osteoarthritis. On the other hand, it is not correct to see osteoarthritis as a completely untreated disease. By relieving basic complaints such as pain with appropriate treatment, the patient is relieved and joint functions are corrected. In parallel, their functional capacity and quality of life can be improved. It is aimed to reduce pain with physical therapy, to protect the range of motion, to dissolve the spasm in the affected muscles or to strengthen the muscles. T he main physical therapy methods used in the treatment of knee osteoarthritis; hot treatments such as hot package, infrared, ultrasound and shortwave, transcutaneous electrical nerve stimulation, interferential current, analgesic currents such as diadynamic current, exercise, massage, spa treatment and laser. In this study, we aimed to evaluate the functional status of patients with knee osteoarthritis and to investigate the effects of transcutaneous electrical nerve stimulation, interference and laser treatments on the pain, physical functions and quality of life of patients with physical therapy modalities frequently used in the treatment of knee OA. Patients with knee OA were randomized into three groups; Group 1 received TENS + hotpack + US + quadriceps strenghtening exercise and electrical stimulation for 3 weeks, Group 2 received interferential current + hotpack + US + quadriceps strenghtening exercise and electrical stimulation for 3 weeks, and Group 3 received low-power laser therapy, stimulation and strengthening exercises for quadriceps muscle for 3 weeks. Pain levels of patients evaluated with visual analog scale, functionallity with Western Ontorio and McMaster Universities Osteoarthritis Index (WOMAC), and quality of life evaluated with short form-36. Significant improvements were observed in the parameters evaluated in all three groups at the end of the study ($p < 0.05$). However, there was no significant difference between the groups in terms of the parameters of values after treatment ($p > 0.05$).

Key words: osteoarthritis, knee, exercise

Journal of Athletic Performance and Nutrition
Volume: 6 Supplement December 2019
2. International Congress on Medical Fitness and Corrective Exercise (ICMFCE) 13-15 December 2019, İstanbul/TURKEY

THE EFFECT OF DIFFERENT PHYSICAL THERAPY METHODS ON PAIN, PHYSICAL FUNCTION AND QUALITY OF LIFE IN PATIENTS WITH MECHANICAL LOW BACK PAIN

Murat YEŞİL, Hilal YEŞİL

Back pain, which is one of the most important health problems that decreases our physical and psychological performance that adversely affects our daily life, is felt in today's modern society as it was in the past. Low back pain is the second most common reason for not going to the doctor and not going to work is the common cold. A large number of patients are forced to live in a limited manner by staying away from work, social life and sporting activities. Lumbar pain that decreases the quality of life of the individuals requires a multifaceted treatment that requires the cooperation of many medical disciplines. Today, exercise and physical therapy methods are considered as important nonpharmacological treatment applications in low back pain treatment protocols. Although the efficacy of these methods has been proven, it has not been investigated that the effects are compared with each other and whether they have superiorities. In this study, we aimed to investigate the effects of transcutaneous electrical nerve stimulation, interferential current and ultrasound therapies on the pain, physical functions and quality of life of patients who have frequently used mechanical back pain in patients with mechanical low back pain. Patients with mechanical low back pain were randomized into three groups; Group 1 received TENS + IR + paraspinal muscle strenghtening exercise and electrical stimulation for 3 weeks, Group 2 received interferential current + IR + paraspinal muscle strenghtening exercise and electrical stimulation for 3 weeks, and Group 3 received US + IR + paraspinal muscle strengthening exercises and electrical stimulation for 3 weeks. Pain levels of patients evaluated with visual analog scale, functionallity with Oswestry index, and quality of life evaluated with short form-36. Significant improvements were observed in the parameters evaluated in all three groups at the end of the study ($p < 0.05$). However, there was no significant difference between the groups in terms of the parameters of values after treatment ($p > 0.05$). In conclusion, in this randomized controlled study, we observed that physical therapy modalities and exercise significantly improved mechanical low back pain in terms of pain, functional status and quality of life.

Key words: exercise, low back pain, quality of life