Articles Published in Brazilian Journals Relevant to Sports and Exercise Medicine; a Review

Original Article

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ABSTRACT

The purpose of this new series of 34 articles is to alert national and international readers to some of the most important recent contributions of the Brazilian medical literature in other areas of specialization. These are works that offer support to many lines of research in this area. The most relevant original articles are selected by experienced editors, who provided us with key words, which are highlighted in order to attract readers' attention. To facilitate reading, the articles are organized by area of interest. To make the maximum use of the limited editorial space, the authors' names are omitted. The final result brings the best of each article, in the authors' opinion, with a personal summary interpretation. Targeted at busy doctors, we hope this initiative will help further knowledge of scientific evidence for use in clinical practice, facilitating access to works of specific interest to the reader.

Keywords: sports medicine, cardiology, orthopedics.

EXERCISE AND CARDIOCIRCULATORY SYSTEM

10 articles directly concerned with exercise and cardiocirculatory system of interest for Sports Exercise Medicine have been selected. To study the association between the HR initial and final transients (fast and slow) in exercise, considering different ways of measuring the resting HR, it was verified that it is important to standardize the HRrest measurement for transients' assessment; the light or moderate association between results of the many transients suggests that partially distinct autonomous mechanisms are involved and that their measures may provide different and potentially complementary clinical support [1]. The study of the association between heart rate recovery after treadmill exertion test and heart rate variability (HRV) demonstrated that the association between heart rate recovery and HRV in 24 hours in the first two minutes after the exercise was not proved. Heart rate recovery was associated with age and sex [2].

Exercises prescribed to coronaropathy patients, according to recommendations from the literature, may trigger myocardial ischemia during rehabilitation session. The comparison between the scintigraphy capacity with myocardial tomography and electrocardiogram capacity in detection of ischemia during rehabilitation session can be well identified by the former [3]. The effects of physical exercise on functional capacity and quality of life of patients with cardiac insufficiency is a reason for investigation. Assessment of patients submitted or not to physical exercises, identified improvement in the group with training in all components of functional capacity when compared to the group with no training ($p < 0.001$). Quality of life improved in patients with training concerning the physical, psychological social and environmental domains ($p < 0.001$), while no significant alteration was found in patients with no training. Guided and monitored physical exercises are safe and provide the possibility to improve functional capacity and quality of life of patients with cardiac insufficiency with multiple etiologies [4].

It is difficult to maintain optimum values of systemic blood pressure in hypertensive patients, even the ones with anti-hypertensive therapy. Exercises may reduce blood pressure in untreated hypertensive individuals; however, its effect when combined with anti-hypertensive therapy in the long run has not been clarified yet. Assessment of the acute effects of a single session of aerobic exercises in blood pressure of treated hypertensive patients in the long run concluded that one session of aerobic exercises reduced the first-aid blood pressure values during 24h in hypertensive patients treated in the long run and increased the percentage of patients who reached normal values of first-aid blood pressure. These effects suggest that aerobic exercises may play an important role in the treatment of blood pressure of hypertensive individuals treated in the long run [5]. Due to the existing controversy in the literature on the possible benefits of resistance training (RT) on resting blood pressure (BP) and also due to the lack of studies with older and hypertensive individuals, RT is little recommended as non-pharmacological treatment for blood hypertension. The effects of progressive RT on resting blood pressure (BP), heart rate (HR) and double product (DP) in controlled older hypertensive women demonstrated that progressive RT reduced resting SBP, MBP and DP of hypertensive older women, controlled with anti-hypertensive medication[6].

In previous studies with patients with intermittent claudication, reduction related to disease in concentric and isometric muscle strength

and resistance resulted in performance lower than in gait. Until the present moment, no study has assessed eccentric muscle action in patients with unilateral intermittent claudication. It was identified that strength and resistance on the symptomatic leg were lower during concentric action than in eccentric action. Further studies should be conducted to investigate the mechanisms subjacent to these responses and to assess the effects of the interventions in order to improve concentric strength and resistance in the functional limitations in patients with intermittent claudication [7].

Obesity interference on the heart rate variability (HRV), the blood lipids and physical capacity of obese children is demonstrated by the alterations in cardiac autonomous control at biped position and reduces physical capacity [8]. The cardiovascular variables behavior to acute effort in adolescents with surplus weight can be studied by this cardiopulmonary test. The pressoric response during exercise was more exacerbated in obese adolescents when compared to those obtained in eutrophic ones, which indicates higher reactivity in the former to physical stress [9].

Since there are not standard methods to assess cardiovascular and pulmonary responses in patients with ***pectus excavatum***, it is difficult or even impossible to compare these studies. These strategies are aimed at doctors, pneumology professionals and exercise physiologists, among other professionals of the health care field who carry out exercise cardiopulmonary tests in patients with ***pectus excavatum.*** The use of strategies described in this article enables comparisons between studies, and the effects of the ***pectus excavatum*** condition in the cardiopulmonary function can be evaluated in more detail [10].

EXERCISE AND ENDOCRINE SYSTEM

Seven articles related to exercise and endocrine systems were selected to Sports Exercise Medicine. Overtraining (OT) is a complex and multifactorial sports condition and there is not an isolate marker for diagnosis of OT. Interestingly, some of the OT symptoms are related to the β-endorphin effects. Some of these effects, such as analgesia, increase to lactate intolerance and exercise-induced euphoria, are important to training, These effects can be reverted by detraining or by OT which causes decrease in performance, reduces tolerance to load and depression. The main stimulus to the β-endorphin secretion is exercise, since its secretion depends on the aerobic and anaerobic exercises volume/intensity. However, excessive training may reduce concentration, altering hence its positive effects. Thus, β-endorphin could be used as an additional marker of OT, especially due to its effects strong correlation with the OT symptoms[11].

Prevalence of surplus weight is increasing worldwide. Obesity is a complex disease of multifactorial origin, with polygenic condition affected by environmental factors. Weight loss is the primary strategy sued to prevent and treat obesity as well as its comorbidities. Weight alterations during life depend on the interaction between environmental, behavioral and genetic factors. Great variation in weight loss is observed among individuals in response to different intervention models (behavioral, restrictions in caloric intake, physical exercises, anti-obesity drugs or surgeries). The role of the polymorphism of the candidate genes to obesity and its influence on weight loss participate in this process. Despite the interaction of the genotype in the body weight loss, described in studies with twins and family members, it is too early to recommend the use of genotyping for weight loss strategies [12].

When functional capacity in eutrophic women with surplus weight and obese was assessed, there was not significant difference between eutrophic and surplus weight for $VO2_{max}$ and HAQ-20 scores. Blood hypertension was more frequent in obese women ($p = 0.012$) who also presented lower educational background ($p = 0.026$). The obese women presented reduction of physical aptitude as well as functional capacity compared to the eutrophic ones and surplus weight, which comes to add to the worse prognostics for cardiovascular diseases of these patients [13].

Deficiency in female gonadal steroids accelerates body mass gain, but the possible central and peripheral mechanisms involved in the increase of food intake and in adipose mass gain which occur in this condition are little known. In animal models, both the absence of flaws in estrogen action cause increase of body mass, clearly demonstrating a possible role of this steroid on post-menopausal surplus weight. It is known that obesity and surplus weight are associated with many comorbidities which may lead to premature death. Therefore, it is very relevant to unveil the mechanisms related to body mass gain, as well as how to develop strategies which are able to prevent its establishment. Regulation of energetic balance is associated with body mass control where physical exercise is an important regulator of this homeostatic parameter. However, the influence of physical exercise on the body mass gain during estrogen deficiency is controversial and depends on the used exercise protocol [14].

Increase of obesity prevalence in children and adolescents may represent a serious public health problem in the next years. Obesity pathogenesis is multifactorial and involves a complex interaction of genetic factors with environmental factors. Obesity in adolescence has been seen only as an aesthetic problem; however, significant increase of cardiovascular risk factors has been observed, probably due to the metabolic alterations related to surplus weight. Since then, strategies of obesity treatment in childhood and adolescence have been proposed. The tripod proposed for the treatment is: change in lifestyle, medication and surgical treatment. Despite the lack of definite evidence, medication treatment in adolescents comes up as an efficient strategy. Sibutramine and orlistat, hence, may be a ggod therapeutic option when changes in lifestyle alone were not efficient [15].

Harm in glucose transportation stimulated by insulin in the muscle constitutes a crucial flaw for the establishment of glucose intolerance as well as type 2 diabetes. On the other hand, it is noticeable that both acute and chronic aerobic exercises may have positive effects on the insulin action in insulin resistance situations. Nevertheless, little is known about the post-exercise molecular effects on the insulin signalizing in the skeletal muscle. New information on the mechanisms through which acute exercise restores insulin sensitivity, especially the important role of the inflammatory proteins and S-nitrosation have on the regulation of proteins of the insulin signaling way in the skeletal muscle is needed [16]. Although exercise is associated with reduction of cardiovascular mortality in type I diabetes mellitus patients (DM1), many issues on the topic 'exercise in DM1' deserve further discussion. For instance: contradictory results have been reported on the benefits of physical activity on the metabolic control of these patients. The kind of exercise which would be more benefic to this group is also controversial. Another point is concerned with the best adjustment in the insulin dosing recommended to exercise practice [17].

EXERCISE AND RESPIRATORY SYSTEM

Seven articles on exercise and respiratory system present direct interest to Sports Exercise Medicine. The submaximal exercise tests, also known as field clinical tests – especially the TC6 (gait test of six min-

utes) –, are acceptable clinic-functional evaluations to the patients, of easy performance, reproducible, with no risk or further complications. However, they do not exclude methodological care which reduces their variability. Their results satisfactorily correlate with maximum exercise tests as well as with functional variables, which have prognostic value and are related to mortality. Their greatest importance though is that they quantify subjective complaints of the patients, offering hence a suitable assessment on the limitations of daily life. Nevertheless, efforts to change them into efficient tests in the use of new medication have been contested. The treadmill TC6 can be interpreted as an improvement and upgrade of the submaximal exercise assessment technique [18].

Validation of a protocol for a treadmill 6-minute gait test (TC6-tread) for assessment of patients with pulmonary hypertension (PHT) showed correlation of the completed distance in the TC6tread and hemodynamic data, as well as with the functional class and distance competed on the ground. Moreover, the completed distance in the TC6tread presented significant correlation with survival rate, corroborating hence its correlation with the disease severity. NO inhaling during the TC6tread led to variations compatible with the hemodynamic ones in the same NO dosing, suggesting that the protocol under study may reflect the effect of therapeutic interventions. It was concluded that the completed distance in the TC6tread is a functional and prognostic marker in the assessment of routine of patients with PHT[19].

In order to evaluate the efficiency of the exercise training with gait protocol, 20 patients with COPD in stages III/IV according to the ***Global Initiative for Chronic Obstructive Lung Disease***, were studied. The patients were assessed at the beginning and end of the exercise program regarding oxygen desaturation, dyspnea/fatigue sensation, quality of life and completed distance in the six-minute gait test. Training effect was evident in the comparison of the completed distances before and after training, with decrease of desaturation for longer distances and in dyspnea sensation. This training program is of easy performance [20].

The physical activities characteristics in the daily life of patients with COPD in Brazil and its correlation with different physiological variables demonstrate that, although the COPD patients here are more active than European patients previously studied, they were less active than healthy older subjects. The gait time/Day of these patients correlated only moderately to exercise maximal and functional capacity[21].

The inspiratory muscle training effects (IMT), respiratory exercise in muscle strength, expiratory flow peak (EFP) and severity variables in asthmatic children demonstrate that IMT and respiratory exercises provide mechanical efficiency improvement in the respiratory muscles, in EFP and severity variables [22].

In the comparison of the effects of deep respiration exercises (DRE) and flow incentive spirometer (IS) in patients submitted to myocardial revascularization surgery (MRS) through the following variables: forced vital capacity – FVC, forced expiratory volume of first second – FEV1, maximum respiratory pressure and oxygen saturation; no significant differences have been observed in the maximum respiratory pressure, spirometric variables and oxygen saturation in patients submitted to deep respiration exercises and incentive in the post-operation period of myocardial revascularization surgery [23].

One literature review on the mechanisms through which the pulmonary respiratory insufficiency process (RI) promotes local and systemic injury of organs and the role of the inflammatory mediators in this situation, approaching the influence of moderate physical exercise as prophylactic measure in complications originated from the pulmonary RI, points out that pre-surgical preparation should involve a multidisciplinary team of the health field and well as a physical educator. Therefore, the physical exercise prescription would be individualized and supervised. Moreover, this pre-surgical preparation Will be able to offer reduction of complications from the operatory process, reduction in the hospital admission time and consequently, improvement in patient's recovery, leading to lower costs to the health system as well [24].

SPORTS ORTHOPEDICS AND TRAUMATOLOGY

Nine articles of purely orthopedic and biomechanical interest with significance to the Sports Exercise Medicine were identified. Mechanical behavior of the proximal third of the femur of rats submitted to aerobic chronic resisted training and the results demonstrate that aerobic resisted training promoted reduction of F_{max} and of bone DF_{max}, respectively. The data evidenced a differential action of both physical training models on the mechanical properties of the femur of rats [25].

Comparison of the double point with the modified Mason-Allen and the simple and double points did not show difference of resistance in the tendon concerning flaw in the suture – tendon interface; however, there is difference when the simple and modified Mason-Allen points are compared [26]. The tendinous sutures on shoulder are efficient and, in a retrospective study, arthroscopic repair of injuries of the rotator cuff (RC) provides low surgical morbidity and enables diagnosis of associated joint injuries. The benefit of the procedure was corroborated especially by significant pain improvement, even in cases of larger injuries [27].

The knee movement pattern in the rest phase was different between children (mean age 9.7 years) and adults (mean age 25 years), which suggests that the maturation process of the normal gait may extend until the second decade of life [28]. On the other hand, balance biomechanical characteristics o folder subjects, based on the oscillation of the pressure center in five positions of foot placement, with eyes opened and closed demonstrates that situations which presented lower stability were the positions with eyes closed and the positions with reduced sustaining polygon. The positions which presented higher stability were feet apart at 10cm and 45° angle, free position and feet parallel and apart at 10cm, all with eyes opened [29].

In order to compare muscle activity of trunk flexor and extensor muscles between asymmetrical and symmetrical swimming styles two groups were studied: asymmetric swimming group (ASG), composed of five athletes who swim the crawl **stroke** and two athletes who swim the backstroke; and the symmetrical swimming group (SSG), composed of seven athletes – four breaststroke swimmers and three butterfly stroke swimmers. It was concluded that the asymmetrical strokes (crawl and backstroke) provide more efficient muscle response (recruiting) in the group of the trunk flexors, possibly by the constant maintenance of the isometric contraction of the abdominal muscles[30].

The clinical result of the autologous osteochondral transplant (AOT) for the treatment of knee osteochondral injuries of athletes in a medium segment of 52 months (30 to 82 months) in 19 patients who were pre and post-surgery assessed by the subjective IKDC, modified Cincinnati and level of return to sports protocols, besides prognosis according to age, time of symptomatology, presence of associated injuries and site of injury, demonstrated that knees submitted to the AOT present significant subjective improvement after surgery. Return to sport occurs in a specific group of patients [31].

Through the use of biomechanical tests, reconstruction of anterior cruciate ligament with double anatomic feixe using patellar graft to the reconstruction with conventional single bundle using the same amount of patellar graft in a paired experimental study in cadaver, did not demonstrate differences between the two techniques in any of the determinations done by the ANOVA test. The reconstruction of the anterior cruciate ligament technique with double anatomic bundle using bone-tendon patellar-bone graft presented similar biomechanical behavior compared to anterior tibial dislocation, stiffness and passive inner tibial rotation [32].

As has been presented by some authors, the program Posture School, designed to patients with chronic low back pain was able to improve quality of life and functional capacity of its participants [33].

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