25 - THE PHYSICAL PREPARATION OF SCHOOL VOLLEYBALL ATHLETES: THE OPTIMIZATION OF STRENGTH AND LOCATED MUSCULAR RESISTANCE ASSOCIATED TO TEENAGERS' HEALTH

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I INITIAL REMARKS

Volleyball, in the present sports conjucture, has had a lot of prominence with the means of journalism and sports disclosure. In this context, it seems that this popularity has boosted its practice, both in professional teams and in school teams. A study done in 1994, for example, estimated that more than 200 million people practice volleyball throughout the world, which comes to confirm the great popularity that this sport has achieved over the decades (AAGAARD et al, 1997).

The volleyball game, within the logic of its rules, has fast game actions, based mainly in the recruitment of muscle fibers present in the lower limbs. Such short-lasting actions have predominance, according Powers & Howley (2005), of the energy source based on ATP-PC, or "phosphagen system" that provides energy for muscle contraction at the beginning of the exercise and in exercises of short duration and high intensity.

The energy source ATP-CP, predominant in the sport in question, requires a great improvement in the muscular strength and power of the athlete's lower limbs and whole body, increasing his capacity to jump vertically and, as a consequence, improving the performance, acting in the energy source in question (FRANCELINO & PASSARINHO, 2007). Moreover, the presence of located muscular resistance and its development in the practice of physical preparation within volleyball seems to be of great importance, since such physical quality enables the athlete to maintain a physical activity in anaerobic conditions for the longest time (TUBINO, 1996).

In this sense, it is noticed that the trainings of physical preparation within volleyball must search for the development of strength and muscular power, so that there is a high level of efficiency during the fast game actions which involves jumps and articulated movements, and also located physical resistance, so that such game actions can be performed repetitively without great loses in the muscular performance. Physiologically, the optimization of the performance through the physical preparation seems to be of great importance in this context, since the trainings with loads and breaks which are based on the proximity and duration of the technical gesture in the game, require a high intensity in specific moments, which seems to be quite present within volleyball (FORTEZA DE LA ROSA & FARTO, 2007).

However, the work of the energy source ATP-CP in loads of strength and muscular power and the development of located muscular resistance for the improvement of these variables can also be thought as an agent in the athlete's health improvement and, mainly, the teenager's health at school age. Several epidemiological studies, cited by Gutierres e Marins (2008) emphasize the great importance of the work of muscle strength in the prevention of chronic-degenerative diseases such as type II diabetes, osteoporosis and dispilidemia, for example, which confirms the great importance of the presence of good levels of physical fitness among the teenagers at school age.

From such reflections, this study aims at discussing the results achieved from the increasement of explosive strength and muscular resistance located in the athletes' lower limbs and abdomen of a school volleyball team from the development of a training directed to the sport in question, relating such results not only to the improvement within the practice of the sport, but also to the improvement that the increasement of the valences related to muscular strength can bring to the life and health quality of these teenagers, from the continued practice of such activities in their daily routines.

II METHODOLOGY

2.1 Sample definition

The sample is made of 10 male students members of the school volleyball team of a federal school, with their CMI ranging between 19,5 and 24,5 and ages between 16 and 17 years old, none of them presented any chronic-degenerative disease or any other pathology that would prevent them from their training exposure.

2.2 Protocol applied to the sample

Each student was exposed to two tests. The first one, of vertical impulsion (Sargent Test, CARNIVAL, 2004) aimed at measuring the vertical impulsion and, consequently, the power of the lower limbs of the students. The second one, of abdominal resistance in one minute (CARNIVAL, 2004), aimed at measuring the located abdominal resistance of the individuals studied, from the highest number of sit-ups done in one minute.

2.3 Instruments used in the assessment

For the purposes of the tests, fitness mats e chronometers were used, in the assessment of abdominal strength, and measuring tape and chalk powder, in the assessment of the power of the lower limbs from the vertical impulsion.

2.4 Training periodization

After the application of the tests described above, the athletes underwent training sessions twice a week. The period of exposure to the training, before the new data collection, took 16 weeks and, therefore, there was a total of 32 training sessions, which were divided as follows:

·The first stage took place in the gym room of the school, comprehending a total of 12 training sessions. In this period, the development of the students' located muscular resistance was observed, from the work of bodybuilding exercises which used isotonic contractions (BARBANTI, 1996). At this stage, series that aimed at the development of located muscular resistance of all muscle groups were developed, from series that had fifteen to twenty repetitions from loads that comprehended the range of 40 to 60% of the maximum effort. This stage of training aimed at the prevention of joint injures and the located strengthening of muscle groups involved actively or passively in the actions of the volleyball game.

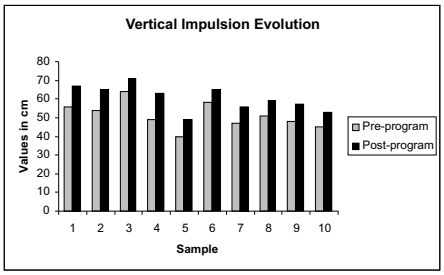
·The second stage of the training took place in the sand field of the school in question. At this stage, the students were asked to work in circuits, in which there were activities based in the execution of vertical and horizontal jumps, abdominal exercises, medicine ball throwing, and short races, followed by the execution of the basic rules of the volleyball game, where the target rule was the practice of forearm pass. In the circuit organization, stages lasted two minutes and breaks lasted thirty

seconds, which were used for their exchanging. The stages were executed in pairs, and the tasks within the proposed stage lasted fifteen seconds the most. Such work aimed at the development of the muscular strength and power, from exercises that provided the proximity of these actions within the volleyball game, achieving with this practice, the development of valences that would provide the improvement of several game actions.

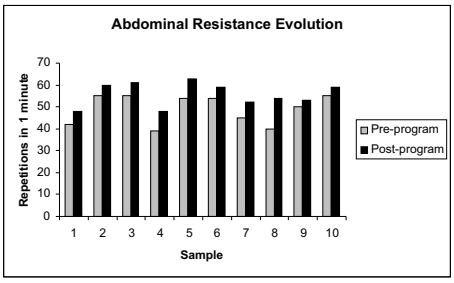
III RESULTS

The results achieved from the application of the training to the sample in questions are presented below.

GRAPHICS I Vertical Impulsion Evolution From The Training Program



GRAPHICS II Abdominal resistance evolution from the training program



IV RESULTS DISCUSSION

The work of power and muscular strength applied to the students who took part in this study showed, as observed the in graphics above, satisfactory results concerning the improvement of the physical valences related to strength, power and resistance, based in the tests applied to the analyzed muscular groupings. From these conclusions, it is notable that a discussion that is focused not only in the clear improvement of the athletes' physical performance within the volleyball game, but also focused in the physical improvements obtained to the health and life quality of these students be done. The improvements that this extra class activity brought to the life quality of the teenagers, concerning mainly the prevention of several kinds of pathologies related to sedentarism should be highlighted.

Several studies relate the behavior during childhood and adolescence to the development of diseases at adult age. Among the associated diseases, Santos (2008), cites pathologies as atherosclerosis, high blood pressure, obesity, etc., relating the development of these diseases to inadequate behavior during childhood and adolescence, such as sedentarism associated to obesity and bad eating habits. Moreover, exogen obesity, corresponding to 95% of the cases of this risk factor, is mainly related to hypoactivity (sedentarism), and to bad eating habits (inadequacy between quality, quantity and high consumption of fast food), according to Dâmaso (2001). Such restriction is both important and worrying, considering that, data from Health World Organization cited by Sapatéra and Pandini (2005), shows that 9% of the Brazilians aged between 10 and 19 years old are obese and such risk factor, for most of them, is due to their high level of sedentarism and their bad eating habits.

Based on these alarming data related to obesity and sedentarism among teenagers, it is important that a brief analysis of the role of physical exercises as a non-medical measure to several pathologies be done. It is known that the practice of physical exercises imposes great and permanent modifications, among which one could cite the increasing of insulin resistance, the reduction of corporal mass, the improvement of physiologic mechanisms of organic resistance, the increasing of bone mineral density, besides several other adjacent mechanisms ((POWERS & HOWLEY, 2005). Consequently, it is noticeable and unquestionable that physical aptitude is a very important factor which is indispensable to health maintenance.

From this principle**,** Gutierres & Marins (2008) analyzed how the development of physical aptitude from a strength training can be useful in the prevention of metabolic syndrome, finding interesting results that can be associated to the sample exposed to the training described herein, since the work of physical preparation was based in the development of explosive strength and of located muscular resistance of the volleyball athletes. The authors highlight that the strength training can impose great and permanent answers to total calorie losses, increasing mainly the basal metabolic tax and, consequently promoting weight maintenance, preventing obesity. Besides, other improvements such as the greater blood vessels elasticity, the greater energy use, the greater muscle capilarization, cited by TUBINO (1996) seem to offer, to those who practice strength exercises, an improvement within the several aspects related to their muscular activity improvement.

Another interesting factor related to the exposition to strength training is the increasement of the immune function. According to Gutierres & Marins (2008), the strength training is responsible for suppressing the functions of the NK cells, increasing the immune function, being an important factor in the angiogenesis process. Such factor seems to be very satisfactory when one talks about teenager health at school age, since the greater immune function offers not only the prevention of chronic-degenerative diseases, but also the prevention of other diseases that can be harmful to teenagers, such as respiratory diseases and ordinary pathologies that can be developed from environmental changes.

Apart from the improvement in the immune function, another very important factor related mainly to the strength exercise is the bone mass increasement. Several studies indicate a strong relation between bone mass and the development of muscular strength, since when stimulated; they will trigger an osteoblastic increasement, in the bone region near the place where they are inserted (Nordström *et al.* 1995). Moreover, several researches confirm that moderate physical activities with weigh support, such as races and jumps, have a more positive impact on bone deposition than activities that do not need weigh support, such as swimming (SILVA et al. 2003). This way, it can be noticed that the volleyball practice, and, consequently, the execution of

exercises based on jumps and races, both during the game actions and during the physical preparation practice, seem to have a significant influence in the bone mass increasement in the teenagers who practice the modality. Such factor becomes very important, as the correspondent implications to such activity lead to unquestionable benefits to the teenagers who are subject of the training described in this study.

Still in relation to the strength training, it is notable to discuss how the improvement of the muscular valences analyzed in this study can act directly in the prevention of pathologies and in the improvement of the life quality of those teenagers who play volleyball.

With respect to abdominal resistance, all the athletes who took part in the training presented a significant improvement in their performance. According to Carnaval's (2004) classification, the analyzed subjects can be fit in excellent levels and above the average in relation to the number of repetitions during the test, described in graphics II. Such good performance has great importance when the health, especially postural, of these athletes, is discussed. According to Prati (2006), good resistance and abdominal strength lead to great posture, besides increasing the peristaltic activity by the increased tension printed by the abdomen at the viscera responsible for digestion.

There is great improvement in the vertical impulsion and, as a consequence, the power of the lower limbs reflects, like the increasement of abdominal resistance, in very important benefits in relation to the life quality and health of the students who took part in the training.

Since the development of vertical impulsion happened from an anaerobic work of strength and muscular power, this training, apart from bringing improvements in relation to the performance in the technical gestures in the game, possibly brought great and permanent benefits that can be satisfactory when one talks about health and life quality.

According to Gutierres & Marins (2008), several studies point out the exercise that is based on strength work as indispensable in the prevention of several diseases commonly present in people's lifestyle nowadays. Variable such as diabetes type II, abdominal fat excess, increasement in the circulating leptin and low hormonal function are some of the several factors in which the physical exercise and, within this line of thought, the anaerobic exercise, is important for the maintenance of health and life quality. Moreover, the metabolic variations related to the strength exercise described in this study seem to act in a significant way in the development of the benefits imposed by the strength training.

V FINAL REMARKS

The several benefits that the physical exercise enables in active individuals are unquestionable from the point of view of health maintenance. It was also seen that the development of physical aptitude during adolescence brings very satisfactory and relevant effects in those teenagers at school age, since it causes effects that will be very important in their development.

In this study it was also discussed how important sports are in teenagers' lives, since the improvements associated to their life quality and health, from the development of physical aptitude based on the practice of sports training and, in this case, on the sport practiced at school, are indispensable for their development.

Consequently, the development of places that enables the teenagers' practice of exercises is of vital importance, no matter whether they are through the sport or the practice of recreational activities. Baring such factor in mind, the intervention from sport and from the physical preparation, from actions carried out by competent professionals in the area, are relevant and extremely important for the improvement of factors related to exercise that are fundamental for the development of a healthier and more competent human being.

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THE PHYSICAL PREPARATION OF SCHOOL VOLLEYBALL ATHLETES: THE OPTIMIZATION OF STRENGTH AND LOCATED MUSCULAR RESISTANCE ASSOCIATED TO TEENAGERS' HEALTH

ABSTRACT:

The practice of volleyball has increased significantly throughout the years, and such factor is also noticeable in school environments, from extra class activities. Within its practice, the sport in question requires a high demand of anaerobic energy sources, based on trainings that involve strength, power and located muscular resistance of the athlete. For the improvement of such inherent aspects during the execution of the basic fundaments of volleyball, the practice of physical preparation becomes indispensable for the optimization of such variables. From these considerations, this paper aims at describing the evolution of the abdominal resistance and the vertical impulsion of 10 volleyball athletes of a school team, aged between 16 and 17 years old, exposed to a physical preparation training based on the development of strength, power and located muscular resistance. From the results achieved, there will be a discussion that focuses not on the benefits that the improvement of the analyzed variables brings to the performance within the game, but a discussion of the results on the improvement of strength, power and located muscular resistance of these teenagers that can be a parameter of health and life quality. This way, this paper aims at discussing the importance of the practice of extra class exercises as a way of keeping the practice of physical exercises among teenagers, fighting sedentarism among school age pupils.

KEY WORDS: health, prevention, physical exercise

LA PRÉPARATION PHYSIQUE DES ATHLÈTES DE VOLLEY-BALL À L´ÉCOLE: L´OPTIMISATION DE LA FORCE ET DE LA RÉSISTANCE MUSCULAIRE LOCALISÉE ASSOCIÉE À LA SANTÉ DE L´ADOLESCENT

RESUMÉ:

La pratique du voley-ball augmente beaucoup au cours des années, ce qui peut être observé aussi dans l´école, à partir d´activités extracurriculaires. Pour sa pratique, ce sport exige beaucoup de sources énergétiques anaérobies, basées sur des travaux qui demandent de la force, de la potence et de la résistance musculaire localisée de l´athlète pratiquant, puisque pour améliorer des aspects inhérents pendant l´exécution des fondements basiques du volley-ball, la pratique de la préparation physique devient indispensable à l´optimisation de ces variables. À partir de ce fait, on a ici l´intention de décrire l´évolution de la résistance abdominale et de l´impulsion verticale de 10 athlètes de volley-ball d´une équipe d´une école, aux âges de 16 et 17 ans, exposés à un travail de préparation physique basé sur le développement de la force, de la potence et de la résistance musculaire localisée. À partir des résultats obtenus, on mènera une discussion qui n´est pas centrée sur les améliorations que le perfectionnement des variables analysées apporte à la performance dans le jeu, mais sur des résultats, à propos de comment le perfectionnement de la force, de la potence et de la résistance musculaire localisée de ces adolescents peut être un paramètre de santé et qualité de vie pour eux. De cette manière, on cherche discuter l´importance de la pratique du sport extracurriculair comme forme d´entretien de la pratique d´exercices physiques entre les adolescents, combattant le sédentarisme parmi les populations plus jeunes à l´école.

MOTS-CLÉS: santé, prévention, exercice physique.

LA PREPARACIÓN FISICA DE ATLETAS DE VOLEIBOL ESCOLAR: LA OPTIMIZACIÓN DE LA FUERZA Y RESISTENCIA MUSCULAR LOCALIZADA ASOCIADA A LA SALUD DEL ADOLESCENTE

RESUMEN:

La práctica del voleibol está creciendo mucho en los últimos años, siendo que tal factor es perceptible también en el medio escolar, a partir de actividades extracurriculares. Dentro de su práctica, el deporto en cuestión exige una grande demanda de fuentes energéticas anaerobias, basadas en trabajos que envuelvan fuerza, potencia y resistencia muscular localizada del atleta practicante, siendo que, para la mejora de tales aspectos inherentes mientras la ejecución de los fundamentos básicos del voleibol, la práctica de la preparación física se vuelve indispensable para optimización de tales variables. Partiendo de ello, ese trabajo visa describir la evolución de la resistencia abdominal y de la impulsión vertical de 10 atletas de voleibol de un equipo escolar, con edades comprendidas en la faja de 16 a 17 años, expuestos a un trabajo de preparación física basado en el desarrollo de la fuerza, potencia e resistencia muscular localizada. A partir de los resultados obtenidos, será objetivada una discusión que no tiene como foco el mejor desempeño que la mejora de las variables analizadas traen a la práctica del juego, sino una discusión de resultados sobre cómo la mejora de la fuerza, potencia y resistencia muscular localizada de estos adolescentes puede ser un parámetro de salud y calidad de vida para los mismos. De esa forma, se busca discutir la importancia de la práctica del deporto extracurricular como forma de manutención de la práctica de ejercicios físicos entre los adolescentes, combatiendo el sedentarismo entre las poblaciones más jóvenes en edad escolar.

PALABRAS-CLAVE: salud; prevención, ejercicio físico.

A PREPARAÇÃO FÍSICA DE ATLETAS DE VOLEIBOL ESCOLAR: A OTIMIZAÇÃO DA FORÇA E RESISTÊNCIA MUSCULAR LOCALIZADA ASSOCIADA À SAÚDE DO ADOLESCENTE

RESUMO:

A prática do voleibol vem aumentando muito no decorrer dos anos, sendo que tal fator é perceptível também em meio escolar, a partir de atividades extracurriculares. Dentro de sua prática, o desporto em questão exige uma grande demanda de fontes energéticas anaeróbias, baseadas em trabalhos que envolvam força, potência e resistência muscular localizada do atleta praticante, sendo que, para o aprimoramento de tais aspectos inerentes durante a execução dos fundamentos básicos do voleibol, a prática da preparação física torna-se indispensável para otimização de tais variáveis. A partir disso, esse trabalho visa descrever a evolução da resistência abdominal e da impulsão vertical de 10 atletas de voleibol de uma equipe escolar, com idades compreendidas na faixa de 16 a 17 anos, expostos a um trabalho de preparação física baseado no desenvolvimento da força, potência e resistência muscular localizada. A partir dos resultados obtidos, será objetivada uma discussão que não tem como foco as melhorias que o aprimoramento das variáveis analisadas trazem ao desempenho dentro do jogo, mas sim uma discussão de resultados sobre como o melhoramento da força, potência e resistência muscular localizada destes adolescentes pode ser um parâmetro de saúde e qualidade vida para os mesmos. Dessa forma, busca-se discutir a importância da prática do desporto extracurricular como forma de manutenção da prática de exercícios físicos entre os adolescentes, combatendo o sedentarismo entre as populações mais jovens em idade escolar.

PALAVRAS-CHAVE: saúde; prevenção, exercício físico.