167 - RELATIONSHIP BETWEEN LUMBAR-PELVIC FUNCTIONAL STABILITY AND LIMB'S FORCE IN YOUNG ATHLETE OF MASCULINE SOCCER AND INDOOR SOCCER

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INTRODUCTION

A growing recognition of the importance of the static muscles function in the body as stabilization and power generation in all of sports games activities. The stability of the pelvic center is being seen as the pivot of an efficient biomechanics that works to maximize the generation of strength and minimize loads in common in all sorts of activities. However, it is necessary that they have a well-structured knowledge about what exactly is the stabilization as well as anatomy and biomechanics of the structures within it (KIBLER et. Al., 2006).

A strong foundation of muscular balance and stability of the pelvic center presents significant importance for athletes in any sport and referring to this article to the athletes of soccer and indoor soccer, especially when it comes to young adolescents who go through a process of structural transformation, physiological and biomechanical in their bodies (WILSON et. al. 2005).

In sport the weakness or lack of sufficient coordination of the muscles of the pelvic center may lead to lower efficiency of movement, patterns of compensatory movements, tension, overtraining, and even injury (LIEBERSON, 2004).

The muscles of the pelvic center are composed of 29 pairs of muscles that support and stabilize the closed kinetic chain formed by the pelvic center of the spine, pelvis and hip during functional movements. When the system works effectively, the result is an appropriate distribution of forces; fine control and efficiency in the movement, adequate absorption of impact forces and an absence of excessive forces of compression, rotation and shear on the articular surfaces (FREDERICSON & MOORE, 2005).

The muscles that make up this system have their specific physiology and biomechanics. They are composed with a predominance of oxidative fibers (contraction - slow) and are located more deeply when we did not have major levers of motion, but provide more stability (RICHARDSON et al., 1999).

It can be observed that these muscles have different physiology and biomechanical properties different from dynamic muscles, which is believed that the form of training and improvement of these conditions are achieved in different ways.

Thus, this article offers a cross-field research that aims to investigate the relationship between the muscular dynamics of the upper and lower resistance to the stabilizing of the center pelvic muscle in young athletes belonging to an ongoing program of training for indoor soccer and soccer.

METHODS

The study population was consisted of 12 athletes from indoor soccer belonging to “Escolinha de Futsal Pequeno Craque” and 12 athletes of soccer belonging to the team “Associação Esportiva de Jacarezinho”. Both were male and were aged from 13 to 15 years.

The sample selection studied follows the next criteria:

·The athlete should be training that modality for at least a year;

·The athlete could not be included in any periodic training of weight lifting;

The athlete could not have any kind of lumbar injury;

·Signature of a consent term.

Assessment

Anthropometric data were collected for weight and height through digital scale and stadiometer Plenna Brand Institute Sao Paulo. It was also checked the status of sexual maturation through the protocol of Tanner (GUEDES & GUEDES, 2005).

The athletes were subjected to two specific types of testing. The first was the Estimated Great Load Test where are established empirically a sub maximum load to bring the assessed to achieve the greatest possible number of repetitions with that load. The exercises performed (Fig. 1) were Extension of knees (Extensor chair), Extension of shoulder (curved rowing), flexion of knees (flexor table) and adduction of the shoulder with elbow extension (Supine Bench press), all standardized according to author GUEDES & GUEDES (2005).



Figure 1: Estimated Great Load Test for the following exercises, respectively: Extensor chair, curved rowing, flexor table, and Supine Bench press.

The second was through specific tests of strength of the trunk (Figure 2) that were described by Lieberson (2004):

·Test of resistance of static protractor:

Athlete's position: prone with the region of the anterior superior iliac spine of the inguinal region (EIAS) at the end of the bank. You use a device of the type of Roman chair positioned with EIAS aligned with the superior edge by the pelvic restraint block. Arms to the sides, ankles set (for belt or hands),

Test: the patient maintains the horizontal position for as long as possible, with the beginning of the timing being

marked ast the athlete took the static position. The evaluator must encourage verbally the athlete.

·Test of resistance of static flexor:

Position of the athlete: the knees and hips are bent 90 degrees. The arms are bent at chest. The feet are anchored with a belt or by the appraiser. And the trunk is linear slope with a surface (wood) which presents an angle to the soil of 60 degrees (Fig. 6).

Test: the wood is removed 10 cm later. The athlete holds the position of isometric flexion of the trunk as long as possible. If any part of the subject touch the wood the test will be finalized.

·Bridge side Test:

Athlete's Position: He will support to the side on the lower pelvis and on the forearm with the elbow flexed and his hands to the front. The top of the leg is put in front of the lower leg with both feet on the ground. The opposite upper arm when supported is positioned against the chest.

Test: the pelvis is high of the table as high as possible forming a line of linear foot to the head. Statically the athlete keeps high for as long as possible.



Figure 2: Testing of specific lumbar-pelvic stability, respectively: Resistance in the trunk extension, flexion strength in the trunk and Resistance in bridge side.

Statistical Treatment

Descriptive and inferential statistical analysis of all data was conducted in SPSS package. For the evaluation of the relationship between tests was used the correlation test of Pearson with the level of significance adopted for all comparisons of $p<0.05$.

RESULTS

The sample showed average and standard deviation, respectively: height 169 cm (8), weight 58 kg (11) and sexual maturation 4, according to the protocol of Tanner. The correlation between the results are presented in **Table 1** can be found that there were negative correlations between bending and maintained EC, FR and SR, and positive side bridge between D and SR, MF and RF, and bridge side E and MF for all the athletes of football. You can also verify that there were no correlations between lumbar-pelvic stability and momentum of the upper limbs.

Table 1: correlations among static strength of trunk and momentum of members.

	Flexion Tr.	Extension Tr.	Side bridge D.	Side bridge E.
RM Supine bench press	-0,26	-0,15	-0,06	0,13
RM Extensor chair	-0,51*	-0,13	-0,18	-0,13
RM Flexor table	-0,42*	-0,11	0,002	0,13
RM Curved rowing	-0,18	0,26	0,18	0,28

* Significant correlation at the level of 0,01.

DISCUSSION

The intense and repetitive training for a sport mode provides muscle retractions, causing imbalances between agonist and antagonist muscles, encouraging changes from bone, muscle and articulation. These imbalances may be exacerbated during the process of growth and maturation due to various changes that occur in the body structure of the athlete reconciled to the early onset of competition for sports practice (RIBEIRO et al, 2003).

The retractions of the muscle in the lower limbs are common in athletes of indoor soccer and football and can be justified by the biomechanics of the sport. They may have a direct relationship with postural changes generating local instability (JUNGE, 2004).

There is a clear relationship between the activation of the intrinsic muscles of the trunk and lower limb movements. Current evidence suggest that a decrease in the stability of the core may be related to muscle imbalances between agonists and antagonists and may predispose to the increase of injuries in lower limbs reducing the performance of the athlete (WILLSON ET. AL, 2005).

Some of the athletes who showed greater dynamic forces of knees' flexion and extension, showed lower performance in the bending of the trunk and side bridges, indicating possible differences in muscle strength and stability between static and dynamic that can be associated with specific training. It was also noted that there was a high incidence of weakness in posterior stabilizing 64% and lateral 78%.

The correlations of different bridges may show a side effect of the dominance of members in control of stability of the trunk. Studies show that sports in which there is a demand for power in the lower limbs (jumps, sprints, explosive movements) tend to lead to an increase of pelvic instability due mainly to an imbalance in knee (RIBEIRO, 2006).

According Guimarães et al (2007), it is known that the balance shows a close relationship with good function of the intrinsic muscles of the trunk, linking up with the best alignment and stability of the lower limb. The pelvic instability generates extra overhead and greater effort on certain joints, decreasing the ligament and muscle efficiency, increasing the risk of injuries. The stability of core is instantaneous and their maintenance is necessary that the components of this complex tissues to adapt continually to change posture, loading conditions to ensure the integrity of the spine and provide a stable base for the movement of the extremities (HAYNES, 2005).

Thus, we believe that the momentum of members and the stability of lumbar-pelvic center is inter-relate with each other, giving a speech not only dynamic training of members, but also of lumbar-pelvic stabilization.

The benefits of conducting a strategic program to stabilize the core with co-prolonged contractions of antagonistic muscles, is the development of efficient local metabolic components, the close of movement within the buffer zone and injury prevention, especially in the lumbar and lower limbs (O'SULLIVAN, 2000).

FINAL CONSIDERATIONS

The negative correlations to preserved flexion show a possible relation of forces between different muscles stabilizers and dynamic, while the various correlations of the bridges may show a side effect of the dominance in controlling stability of the trunk. You can note that static and dynamic muscles have different functions and should be worked in a specific way.

Thus, a vocational training intervention directed to muscle deep in young athletes can be a solution to fix the potential instability of improving performance and decrease the incidence of injuries.

Keywords: dynamics force, static stability and pelvic center.

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RELATIONSHIP BETWEEN LUMBAR-PELVIC FUNCTIONAL STABILITY AND LIMB'S FORCE IN YOUNG ATHLETE OF MASCULINE SOCCER AND INDOOR SOCCER

ABSTRACT

It is growing the importance recognition of the static function in the body as stabilization and power generation in all of sports games activities. The stability of the pelvic center is being seen as pivot of an efficient biomechanics that works to maximize the generation of strength and minimize common loads in all sorts of activities. The purpose of this study was to investigate the relationship between muscles stabilization of the center pelvic with the dynamics power of the upper and lower limbs in soccer and indoor soccer young athletes belonging to the Jacarezinho's Municipal Sports School. Participants were 24 male athletes, aged between 13 and 15 years being 12 of indoor soccer and 12 of soccer. The assessment of estimated great load for the extensor chair (EC), flexor table (MF), curved rowing (RF) and supine bench press (SR), and specific tests of maintained trunk's flexion and extension stabilizers and bridges right (D) and left (E) sides. The data were treated with Pearson correlation coefficient with $p < 0.05$ for the variables, dynamic forces and statistical in the program SPSS. The sample showed average and standard deviation, respectively: height 169 cm (8), weight 58 kg (11) and sexual maturation 4, according to the protocol of Tanner. Among the most significant results we can see negative correlations between maintained flexion e EC, FR and SR, and positive between side bridge D and SR, MF and RF, and bridge side E and MF all for the athletes of soccer. The negative correlations to maintained flexion show a possible different relationship between stabilizers and dynamic forces, while different correlations of the side bridges may show an effect of the dominance in controlling trunk's stability. You can then noted that static and dynamic muscles have different functions and should be worked specifically.

Keywords: dynamics force, static stability and pelvic center.

RELATION ENTRE LA STABILITé FONCTIONNELLE LOMBAIRE-BASSIN ET LA FORCE DES MEMBRES DES JEUNES JOUEURS DANS LE FOOTBALL ET LES HOMMES DE FUTSAL

RÉSUMÉ

Une reconnaissance croissante de l'importance de la fonction de stabilisateur muscles dans le corps et la production d'électricité dans toutes les activités de sports. La stabilité statique a été considéré comme le pivot efficace biomécanique qui cherche à maximiser la génération de force et de minimiser les charges de tous les types d'activités. Le but de cette étude était d'étudier la relation entre les muscles pelviens stabilisateur center avec la puissance de la dynamique les membres supérieurs et inférieurs chez les jeunes athlètes de football et de futsal de l'école municipale des sports de Jacarezinho. Les participants 24 athlètes de sexe masculin, âgés 13 et 15, 12 football en salle et 12 de football. L'évaluation de la charge optimale estimé pour l'appareil extenseur de la chaise (CE), tableau de flexion (MF), l'aviron Front (RF) et de droit en décubitus dorsal (SR), et des tests spécifiques de stabilisateurs de flexion et d'extension du tronc et de maintenir des ponts côté droit (D) et gauche (E). Les données ont été traitées avec coefficient de corrélation de Pearson, avec p <0,05 pour les variables et les forces dynamiques dans le program statistique SPSS. L'échantillon a montré moyenne et écart-type, respectivement: hauteur 169 cm (8), poids 58 kg (11) et la maturation sexuelle 4, selon le protocole de Tanner. Parmi les résultats les plus significatifs, nous pouvons voir les corrélations négatives entre la flexion et maintenu CE, FR et SR, et côté positif pont entre D et SR, MF et RF, et le pont côté et MF et pour tous les athlètes de football. Les corrélations négatives de faire preuve d'une possible relation de flexion conservés entre les différentes forces de stabilisateurs et dynamique, tandis que les différentes corrélations les ponts de mai montrent un effet secondaire de la position dominante dans le contrôle de la stabilité du tronc. Vous pouvez ensuite noté que statique et dynamique des muscles ont des fonctions différentes et devraient être spécifiquement.

Mots clés: la force dynamique, la stabilité statique et pelvienne center.

RELACIÓN ENTRE ESTABILIDAD FUNCIONAL LUMBO-PÉLVICA Y FUERZA DE MIEMBROS EN ATLETAS JÓVENES DE FÚTBOL Y FUTSAL MASCULINO

RESUMEN

Es creciente el reconocimiento de la importancia de la función de los músculos estabilizadores en el cuerpo y generación de fuerza en todas las actividades de juegos deportivos. La estabilidad estática viene siendo vista como pívot de la biomecánica eficiente que funciona para maximizar la generación de fuerza y minimizar cargas en todos los tipos de actividades. El objetivo de este trabajo fue verificar la relación entre músculos estabilizadores del centro pélvico con a fuerza dinámica de miembros superiores y miembros inferiores en jóvenes atletas de fútbol y futsal pertenecientes a las Escuelas Municipales Deportivas de *Jacarezinho*. Participaron 24 atletas del sexo masculino, con edades de entre 13 y 15 años, siendo 12 de futsal y 12 de fútbol. Fue realizada evaluación de carga óptima estimada para los aparatos de silla extensora (CE), mesa flexora (MF), remada frontal (RF) y supino recto (SR), y testes específicos de estabilizadores de flexión y extensión del tronco mantenidas y puentes laterales derecha (D) e izquierda (E). Los datos fueron tratados con coeficiente de correlación de Pearson con p<0,05 para las variables fuerzas dinámica y estática e el programa estadístico SPS. La muestra presentó promedio y desvío padrón, respectivamente de: altura 169 cm. (8), peso 58 kg. (11) y madurez sexual 4 de acuerdo con el protocolo de Tanner. Entre los resultados más significativos podemos verificar correlaciones negativas entre flexión mantenida y CE, RF y SR, y positivas entre puente lateral D y SR, MF y RF, y puente lateral E y MF todos para los atletas de fútbol. Las correlaciones negativas para flexión mantenida muestran una posible relación de diferentes fuerzas entre estabilizadores y dinámicos, en cuanto a las diferentes correlaciones de los puentes laterales pueden mostrar una influencia de la dominancia en el control de estabilidad del tronco. Es posible entonces observar que músculos estáticos y dinámicos presentan funciones diferentes y que deben ser trabajados específicamente.

Palabras-clave: fuerza dinámica, estabilidad estática y centro pélvico.

RELAÇÃO ENTRE ESTABILIDADE FUNCIONAL LOMBO-PÉLVICA E FORÇA DE MEMBROS EM ATLETAS JOVENS DE FUTEBOL E FUTSAL MASCULINO

RESUMO

É crescente o reconhecimento da importância da função dos músculos estabilizadores no corpo e geração de força em todas as atividades de jogos esportivos. A estabilidade estática vem sendo vista como pivô da biomecânica eficiente que funciona para maximizar a geração de força e minimizar cargas em todos os tipos de atividades. O objetivo deste trabalho foi verificar a relação entre músculos estabilizadores do centro pélvico com a força dinâmica de membros superiores e membros inferiores em jovens atletas de futebol e futsal pertencentes às Escolas Municipais Desportivas de Jacarezinho. Participaram 24 atletas do sexo masculino, com idades entre 13 e 15 anos, sendo 12 de futsal e 12 de futebol. Foi realizada avaliação de carga ótima estimada para os aparelhos de cadeira extensora (CE), mesa flexora (MF), remada frontal (RF) e supino reto (SR), e testes específicos de estabilizadores de flexão e extensão do tronco mantidas e pontes laterais direita (D) e esquerda (E). Os dados foram tratados com coeficiente de correlação de Pearson com p<0,05 para as variáveis forças dinâmica e estática no programa estatístico SPSS. A amostra apresentou média e desvio padrão, respectivamente de: altura 169 cm (8), peso 58 kg (11) e maturação sexual 4 de acordo com o protocolo de Tanner. Entre os resultados mais significativos podemos verificar correlações negativas entre flexão mantida e CE, RF e SR, e positivas entre ponte lateral D e SR, MF e RF, e ponte lateral E e MF todos para os atletas de futebol. As correlações negativas para flexão mantida mostram uma possível relação de diferentes forças entre estabilizadores e dinâmicos, enquanto as diferentes correlações das pontes laterais podem mostrar uma influência da dominância no controle de estabilidade do tronco. É possível então observar que músculos estáticos e dinâmicos apresentam funções diferentes e que devem ser trabalhados especificamente.

Palavras-chave: força dinâmica, estabilidade estática e centro pélvico.