

Effect of recuperation with static stretching in isokinetic force of young football players

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Abstract:

Recuperation in the last part of training known as “Cool Down” is very important for a football player. Slow running and static stretching are typical activities of this part, but in the last decade the static stretching and its impact on the motoric performance are some of the most discussed topics in the sports sciences and medical ones. The objective of this research is to prove the impact of recuperation with flexible exercises (static stretching) in an isokinetic force at the young football players. This research has taken place between August and November 2015 with a sample of 24 football players of age 13.9 ± 0.5 years (range 13-15 old of age), divided in the control group and the experimental group. In the beginning the initial anthropometric and isokinetic measures took place for both groups. Isokinetic extension and flexion peak torque were measured with dynamometer Biodex System 4, at $120^\circ/\text{s}$ (degree/sec) in sitting position. At the football players only the good foot was measured. Both groups of the football players have completed the regular training programme. The experimental group (despite the control group) during the stage of recuperation (cool down), except the running with slow pace did also carry out the experimental program which did take place through static stretching. Every static stretching lasted 20 seconds. After the experimental phase is finished the participants did undergo the final measures. The conducted results with univariate analysis of variance (ANOVA) in two tests (initial and final), have shown unimportant statistical values between the control group and the experimental one in the isokinetic force. From the collected results we can conclude the recuperation with static stretching training in the end of the training process (during the cool down) has an unimportant statistical impact in the isokinetic force of the young football players.

Key words: soccer young players, recovery, static stretching, isokinetic strength

Introduction

Football is a sport that is characterized by numerous and varied complex dynamic kinesiology activities that are characterized by a large number of cyclic and acyclic movements (Bjelica et al. 2013; Gardasevic et al., 2016). The coniditional preparation is the base to execute all the elements techno-tactical and responsible to differentiate between the high and low levels of the football players (Popovic et al., 2013; Popovic et al., 2014). During a football match the players carries out around 1200-1400 different moving activities from which 700-800 of those are movements with change in directions (sprint, jumpings, stoppings, restarting etc.) and only 11% of the total distance of these movements are executed with high intensity and important for the outcome of the match (Reilly & Wiliams, 2005; Stolen et al., 2005). All these mentioned movements are closely linked with the production of dymanic force during the flexion and extension of the knee (Newman et al., 2004). So we can suppose that the isokinetic forces are highly responsible or responsible for the taking of these actions.

Recuperation of the organization of the player is one of the main competent to raise the performance in sport. The ending part of the training, the cool down, is important to fasten the recuperation where the activities such as running with slow pace and the static stretching are typical for this part. The calming down of the organism is reached through static stretching, which is on of the main processes that are applied to prevent and save the main physical elements for the “recuperation of the players” (Karin et al., 2007; Sporiš et al., 2010). The static stretching for decades has been part of the warming up during the training but also during the competetions with the aim to raise flexibility, performing the sport performances and to prevent injuries. The execution of high number of movements with changing the pace and the direction of the movement, jumping, execution of technical elements, despite others is also depended on the flexibility of the locomotoric system. (Vučetić et al., 2003; Carling et al., 2010; Gardasevic & Bjelica, 2013). A number of researches carried out in the last decade have shown that the static stretching applied during the warming up has had an impact in lowering the performances in speed, agility and jumping (Nelson et al., 2004; Chaouachi et al., 2008; Behm et

al., 2011; Gelen, 2010; Sayers et al., 2008; Albrecht et al., 2001; Zakas, 2005). The research that was carried out suggests that during the warming up should be applied exercises of dynamic flexibility combined with the static stretching exercises with controlled movements and a fully optimal amplitude (ROM) which are more effective in developing the flexibility and improvement of the explosive force of sprint (Frederick & Szymanski, 2001; Sporiš, 2007; Andersen, 2005). All types of stretching are effective in growing the movement amplitude. (Lucas et al., 1984; Magnusson et al. 1998; Walker, 2006). Stretching after exercise is commended as a preventative measure for delayed onset muscle soreness and improved range of motion through dispersion of edema or tension reduction of the muscle-tendon unit (Montgomery et al., 2008). A research carried out with 26 football coaches of Mauritius Football Association (MFA), 76% of those think that stretching should be exercised three times a week during the "getting ready" period and 2 times during the week while in competition, especially from the regular sessions with duration of 0.6 to 1.3 hours a week (Kelly et al., 2012).

The aim of this research was to prove the impact of the static stretching in the exercises which are applied during the phase of recuperation during the training (cool down) in the isokinetic force of the young football players under the age of 15. Isokinetics is a form of exercise where a person provides a maximum muscle contraction against a resistance or lever arm, (isokinetic dynamometer) at a fixed speed through a given range of motion. This type of muscle action can be done either concentrically or eccentrically at the given joint (Kowalski, 2003). Peak Torque Is the greatest amount of force produced by a muscle. This can be determined within each repetition or the entire set. Peak torque indicates the muscle's maximum capability of developing force. This is also equivalent to a 1- repetition maximum isotonic strength test. Peak torque is an absolute value (Kowalski, 2003). Static Stretch The technique of lengthening a muscle group by slowly moving a joint to its maximal range of motion and maintaining the position for a period of time (Guissard & Duchateau, 2006).

Material & Method

In order to carry out this research, first of all the whole sample has carried out the medical check up at the medical sport centre in Prishtina and it has been proved that all the football players are healthy to participate in football, and in accordance with the Helsinki declaration, all the participants have been informed with the aim of the testing procedures and the experimental treatment.

Participants

In this study have participated twenty four young football players under the age of 15, part of the football school of the club Ramiz Sadiku from Prishtina which were under direction of a UEFA licensed trainer where they have carried out regular training sessions and champion competition in the elite league of football of Kosovo, in the first macrocycle (training sessions and competitions) of the autumn season from 1st of August to 1st of December 2015.

Procedures

Participants divided in the control group (n=12) and experimental (n=12) have been compared in the initial tests and the anthropometrical final ones (height and body weight) and the isokinetic force (Peak Torque flexion and extension). All these measures have taken place in the diagnostification lab of the Sports College Universe in Prishtina in the same time and date, from a specialized team. The initial testing took place before the beginning of the pre-season while the final testing was performed at the end of the season (after 16 weeks of intervention with static stretching exercise). The average age of all participants has been 13.9±0.5 years (range 13-15 years of age), and the first step that was taken was the measurement of the body height 168.4±8.5 cm (Martin's anthropometer), and the body weight 52.9±8.5 kg (In body 720). Football players in this study after the warming up procedure of 6 minutes running in the ergometer bicycle, did go under the test of isokinetic force, peak torque flexion and extension (Grbovič, 2013).

The isokinetic strength of the knee flexors and extensors (dominant leg) was measured using the isokinetic dynamometer Biodex System 4. Isokinetic extension and flexion peak torque was measured at 120°/s (degree/sec) in sitting position with a hip angle 100 degree. Individual seat settings were stored in PC memory before measuring the leg and were automatically activated in the process of measuring and follow up-testing. At the beginning of the follow-up testing individual settings were rechecked and adjusted if necessary. The participants were instructed to hold the hand-grips located at the side of the seat during all testing efforts. During the testing procedure the players were provided with concurrent visual feedback in the form of an isokinetic strength curve displayed on the dynamometer monitor.

Participants of this research divided into two groups (control and experimental) during the period of August and November 2015 have exercised 3 times a week, in total doing 48 training sessions, under the plan and the programme of the football school of the Ramiz Sadiku Club in Prishtina. Protocol of control group (general warm up 5-7 min, specific warm up 10-15 min, the main part 35-45 min, cool down 10 min recovery by running). Protocol of experimental group (general warm up 5-7 min, specific warm up 10-15 min, the main part 35-45 min, cool down 10 min recovery with running and 15 min static stretching). The experimental group (compared to the control group) except the regular training, did undergo the experimental programme (recuperation with static stretching) which has taken place during the cooling down phase. The experimental

programme was planned from the research author based on the recommendations of the authors of this field (Anderson, 2006; Walker, 2006; Lycholat, 1999) and did involve 17 stretching exercises—static stretching; upper body-flexibility exercises (Neck stretch, Upper Back, Chest and Back, Shulder and mid–upper Back, Shoulder and triceps, Lateral flexion right-left) and lower body flexibility exercises (Hamstring Two Leg Stretch, Achilles and Back Stretch, Quadriceps Stretch, Hamstring and Groin Stretch, Standing Groin Stretch, Groin Stretch, Chest Stretch, Sitting Hamstring Stretch, Lower Back Stretch, Two Leg Seatet Hamstring Stretch, Achilles Tendon Stretch). Every exercise has been completed within the duration of 20 seconds.

Statistical analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS version 21.0). Mean and Standard Deviation (SD) were calculated for both groups in initial and final measurement for anthropometric (body height and body weight) and isokinetic force (peak torque flexion and extension). With univariate analysis of variance (ANOVA) were calculated differences between arithmetic means of control and experimental group before and after experimental programme (static stretching). The level of significant is $p < 0.05$.

Results and Discussion

The descriptive parameters are displayed in Table 1. for both groups in initial measures.

Table 1. The variables data of antropometric (body height and body weight) of the control and experimental group at the initial measurement

Variable	control group (M±SD)	experimental group (M±SD)	F	p-value
Age (years)	14.0 ± 0.4	13.8 ± 0.5	-	-
Weight (kg)	52.36 ± 8.93	53.45 ± 8.48	.094	.762
Height (cm)	169.0 ± 9.6	167.8±7.6	.109	.745

The results of the anthropometric measures in the Table 1. show that with the univariate analysis of variance (ANOVA) based on the coefficient F–relations and the value of the statistical significane p–value have been proved that there are unimportant statistical differences between the control group and the experimental one, which does prove the homogeneity of the groups in the initial measures of the main anthropometric parameters (body weight and height) at the football players under the age of 15.

Results gathered from the testing of the isokinetic force performances are shown in the Table 2. and show that with the univariate analysis of variance (ANOVA) based on the coefficient F-relations and the value of the statistical importance (significant) p–value have been proved unimportant statistical differences between the control group and the experimental ones, which do prove the homogeneity between groups during the initial isokinetic force (peak torque flexion and extension) of the football players U15.

Table 2. The significance of differences between arithmetic means of variables data of isokinetic force (peak torque flexion and extension) of the control and experimental group at the initial measurement

Variable	control group (M±SD)	experimental group (M±SD)	F	p-value
peak torque flexion	68.54 ± 16.5	72.61 ± 16.4	.366	.551
peak torque extension	72.67 ± 21.2	88.37 ± 26.0	1.39	.250

The results of the anthropometric measures in Table 3. show the using the univariate analysis of variance (ANOVA) and based on the coeficient F-relations and the value of the statistical importance (significant) p–value have been proved unimportant statistical differences which prove that the experimental programme (static stretching exercises) did not have any impact in the diferences of the final measures in the main anthropometric parameters (body height and weight) of the football players.

Table 3. The significance of differences between arithmetic means of variables data of anthropometric (body height and body weight) of the control and experimental group at the final measurement

Variable	control group (M±SD)	experimental group (M±SD)	F	p-value
Age (years)	14.4 ± 0.5	14.2 ± 0.5	-	-
Weight (kg)	54.3 ± 9.1	56.1 ± 8.3	.266	.611
Height (cm)	170.3 ± 9.6	169.7 ± 7.0	.029	.865

The reults of the isokinetic force performances have been shown in the Table 4. and show that with univariate analysis of variance (ANOVA) based on the coefficient F–relations and the statistical imporantce value (significant) p–value have been proved unimportant statistical differences in the final testings of the isokinetic force (peak torque flexion and extension). The given results do prove that the experimental

programme (static stretching exercises) have not had any impacts in differentiating between the groups in the final measured variables of the isokinetic force.

Table 4. The significance of differences between arithmetic means of variables data of isokinetic force (peak torque flexion and extension) of the control and experimental group at the final measurement

Variable	control group (M±SD)	experimental group (M±SD)	F	p-value
peak torque flexion	93,98 ± 24.8	105,38 ± 31.6	.964	.337
peak torque extension	94,41 ± 18.6	105,36 ± 26.1	2.62	.110

Although a great number of studies have focused on the evaluation of isokinetic strength of lower extremities in soccer players, most of these studies have been focused only on changes of isokinetic strength of knee flexors and extensors after a training program applied during the season (Asklings et al., 2003; Gioftsidou et al., 2008; Brito et al., 2010; Lehnert et al., 2014).

The static stretching is still one of the main discussions in sport and medicine. Stretching should be applied during the warming up session or the cooling down session, to prevent the injuries, and to stimulate the motoric performances or for other reasons, so, there are different thoughts that exist when and in what form, the application of the stretching exercises do have an impact in favour or not in favour in the anthropologic status of the football players. From a lot of researchers it has been proved that the exercises of the static stretchings applied in the warming up session have a negative impact with an statistical importance in the speed, agility and the explosive force of the football players (Little & Williams, 2006; Nelson et al., 2004; Gelen, 2010; Brandey et al., 2012; Power et al., 2004; La Torre, 2010; Haddad et al., 2014). Compared to the mentioned researches above, some researches have researched in the impact of the combined stretching (dynamic and static) and have not proved any determinant impacts in the motoric performances: speed and agility (Behm et al., 2011; Samson et al., 2012; Gonçalves et al., 2013). In the last decade the impact of the static stretching in the motoric performance applied in the warming up session has been researched on from a lot of sport and medicine researches. But the main reason for this study is that numerous researches have shown that static stretching can decrease soccer performance especially dynamic force during knee extension and flexion (isokinetic peak torque) in the youth soccer players. Isokinetic dynamometry is considered an objective and reliable diagnostic tool which enables practitioners to identify torque through a given range of movement and during varying limb velocities (Dirnberger et al., 2012). Wrigley (2000) suggested that isokinetic testing of knee flexor and extensors is reliable and sensitive enough to explore seasonal changes in soccer players.

The results according to the univariate analysis of variance (ANOVA) have shown that the static stretching exercises applied at the end of the training session “cool down” have had no important impact in the isokinetic force of the football players under the age of 15. The figures of the results of the isokinetic force (peak torque flexion and extension) do reflect unimportant statistical differences between the control group and the experimental ones in the initial and final testings, which proves that the static stretching during the cool down do not have any statistical importance effect in the isokinetic force of the football players under the age of 15. The outcomes of the results of the isokinetic force (peak torque flexion and extension) reflect unimportant statistical differences between the control group and the experimental one during the initial and final testings, which does prove that the static stretching exercises taking place during the cooling down period do not have any important statistical effect in the isokinetic force of the flexive and extensive muscles of the feet of the young football players.

Conclusions

In this research it has been proved that the static stretching exercises applied 3 times a week during the cooling down period, in a duration of 16 weeks did not have any important statistical effect in the testing of the isokinetic force at the football players U15. We can conclude that the static stretching exercise applied in the end of the training sessions (cool down) do not have any impact in the isokinetic force of the young football players. So at the young football players we can recommend the application of the static stretching in the end of the training session 2-3 times a week or also in the special training sessions with the objective to raise the optimal flexibility of the body as one of the pre conditions to execute the speed movements, agility, coordination, explosive force and the execution of the technical elements of the football match. These results can be used to fill in the existing knowledge of the impact of the static stretching in the cool down at the young football players in the performances of the isokinetic force and to rationalise the processes when it comes to the plan and program content of the training sessions.

Furthermore the results of this study can be used as an incentive to research the impact of the static stretching in the cool down and other characteristics of the anthropologic status (morphologic characteristics, other motoric performances, functional, psychological, rehabilitation, recuperation, prevention of injuries, demonstration of the technical elements etc.).

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