

## SEASONAL EVALUATION OF REGIONAL STRENGTH OF ATHLETES OF NATIONAL TEAM OF KYRGYZSTAN FROM DIFFERENT BRANCHES OF SPORT BEFORE 2016 SUMMER OLYMPIC GAMES

DEMİRHAN BILAL<sup>1,4</sup> CANUZAKOV KANAT<sup>1</sup>, ABDURRAHMANOVA CIPARE<sup>1</sup>, GUNAY MEHMET<sup>2</sup>, BOLZHIROVA EMILLIA<sup>3</sup>

### Abstract

**Objective.** In this work, the changes in the regional strengths during the seasonal training period of 38 athletes prepared to qualification before 2016 Summer Olympic Games were analyzed. The research was conducted on 35 male and 3 female national athletes including 9 male Greko-Roman wrestlers (24±4,5 years), 10 male Freestyle wrestling athletes (22,10±3,21 years), 8 male judokas (23,6±1.89 years), 8 male athletes (22,29±2,87 years), and 3 female athletes (21,67±2,08 years)

**Methods.** The regional strength of the participating athletes were measured 3 times in total, immediately before the 6-month training period, 3 months later and 6 months later. Measurement of Hand Grip Strength (HGS) of athletes was assessed using the Takei brand Hand dynamometer and back and leg strength was measured by the Takei back-lift Dynamometer. To determine the difference between the measurements, the test "Analysis of variance in repeated measurements" was used. Differences in  $P < 0,05$  were considered significant.

**Results.** Study revealed that, judokas', Greco-Roman and freestyle wrestlers' back and leg strength were significantly higher ( $P < 0,05$ ) on the 6th month compared to baseline and 3 month later measurements. Left and right grip strength did not reflect any statistical differences according to time measurement in all branches of Sport ( $P > 0,05$ ). The strength values of female athletes showed no statistical difference between the measurements ( $P > 0,05$ ).

**Conclusions.** Strength training, which wrestlers, judokas and male athletes were engaged in during the preparatory period, led to an increase in the value of the back and leg strength, as they approached the period of the competition. However, it was observed that, even the features of strength that is important for wrestling athletes are increased, in general, this increase is lower than expected for Olympic athletes. For this reason, it was concluded that the athletes have to carry out more planned studies to gain strength during the preparation period.

**Key words:** Olympic athletes, seasonal change, regional strength, Wrestling, Athletics, Judo.

### Introduction

In sport science, the strength is defined as the ability of muscles to carry out work against a resistance. Muscle strength, also defined as a skill, is an important component in enhancing sport performance. Increasing muscle strength athletes can improve their performance and prevent injuries. (Komi 2003, Yenigün et al. 2010) Although thickening of muscle fibers is directly related to muscle strength neural factors also play an important role in strength development. (Tansu 2006, Mc Ardle et al. 2010). The amount of force depends on strength, joint structure, distance and mechanic angle of ligament and joint axis, joint movements, tendon and other features of muscle tissue. The transfer of a person some kind of item or himself from one place to another shows the existence of force. (Sevim 2002).

Along with training strength person increases

the number of muscle fibers that the nervous system can stimulate through its receptors. The activation of more muscle fibers can result in more force being produced even the muscle tone remains unchanged. Furthermore, increasing muscle fiber diameter with the help of hypertrophy also leads to an increase in muscle strength. (Koz et al.2010).

The increase in muscle size is called hypertrophy and is related to strength. The formation of hypertrophy depends on the increase in diameters of preexisting muscle fibrils. Hypertrophy appeared in muscles increases the strength parallelly. By weight training, white muscle fibers respond better than red muscle fibers. (Mc Ardle et al.2010, Garrett and Kirkendall 2000) Along with muscle hypertrophy, the number of myofibrils and mitochondria increase intensively, and the phosphagen system develops. In addition, glycolytic capacity as well as aerobic capacity will

<sup>1</sup> School of Physical Education and Sports, Kyrgyz Turkish Manas University, KYRGYZSTAN

<sup>2</sup> Faculty of Spor Sciences, Gazi University, TURKEY

<sup>3</sup> Kyrgyz State Academy of Physical Culture and Sport, KYRGYZSTAN

<sup>4</sup> Yasar Dogu Faculty of Spor Sciences, Ondokuz Mayıs University, TURKEY

E-mail address: bilaldemirhan@gmail.com

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be improved.(Foss 1999).

In this study, changes in strength parameters of sportsmen from 4 different branches of national team of Kyrgyzstan in total 3 times measurements; in the beginning, after 3 month and after 6 month during preparatory period of 2016 Summer Olympic Games were analyzed.

#### Methods

Totally, 35 male and 3 female athletes from National team of Kyrgyzstan including 9 male Greko-Roman wrestlers (aged 24±4,5 years), 10 male Freestyle wrestling athletes (aged 22,10±3,21 years), 8 male judokas (aged 23,6±1.89 yr), 8 male athletes (aged 22,29±2,87 yr), and 3 female athletes (aged 21,67±2,08 yr) were involved in the research. The regional strength of the participating athletes were measured 3 times in total, immediately before the 6-month training period of the preparation process of competitions before 2016 Summer Olympic games, 3 months later and 6 months later.

#### Ethical approval

Detailed information about the study was given to the subjects before the measurements and the voluntary confirmation form was signed. The study protocol was approved by the ethics committee of Kyrgyzstan State Sports Academy no. 2017/115.

#### Measurement of Grip (Pinch) strength

Measurement was assessed using the Takei brand Hand dynamometer. After warming for five minutes, while the subject was standing without

bending his arm to be tested and touching the body and the arm was at a 45 degree angle to the body measurements were taken. This was repeated three times for both right and left hands and the highest value was used.

#### Measurement of back and leg strength

Back and leg strength was measured using the Takei back and lift dynamometer. After warming for five minutes, subjects placed their legs on the base of the dynamometer and while the arms are stretched, back is straight and the body is slightly leant forward pulled up the bar of the dynamometer as hard as they can while trying to extend their legs. This traction was repeated three times and the best value for each test subject was recorded.

#### Statistical evaluation

Statistical evaluation of the results was made with SPSS 21.0 computer package program and arithmetic means and standard deviations of all parameters were calculated. The "Single Sample Kolmogorov-Smirnov" test was applied to determine the homogeneity of data. The Analysis of variance in repeated measurements was used in determination of differences between all three measurements. Differences in  $P < 0.05$  were considered significant.

#### Results

The seasonal changes in the measurement of regional strength of athletes involved in the research are summarized in the following tables.

**Table 1. Measurement of grip, back and leg strength of Greko-Roman wrestling athletes (kg)**

Timings	Right grip strength (Mean± sd)	Left grip strength (Mean± sd)	Leg strength (Mean± sd)	Back strength (Mean± sd)
<b>Measurement I. (at the beginning)</b>	49,14 ± 4,55 <sup>A</sup>	47,42 ± 3,97 <sup>A</sup>	170,35 ± 16,37 <sup>B</sup>	160,9 ± 17,68 <sup>B</sup>
<b>Measurement II. (after 3 month)</b>	50,8 ± 7,29 <sup>A</sup>	48,64 ± 6,32 <sup>A</sup>	172,3 ± 11,08 <sup>B</sup>	165,8 ± 18,6 <sup>B</sup>
<b>Measurement III. (after 6 month)</b>	53,17 ± 4,27 <sup>A</sup>	48,28 ± 4,75 <sup>A</sup>	180,9 ± 9,81 <sup>A</sup>	170,65 ± 14,34 <sup>A</sup>

A,B,C: The difference between the meanings of different letters in the same column is significant ( $P < 0,05$ ).

In this study, no statistically significant difference was found ( $P > 0,05$ ) in the analysis of measurements (in the beginning, after 3 month and 6 month) of right and left grip strength of the Greco-Roman wrestlers conducted within the group. While the highest value ( $P < 0,05$ ) of back

and leg strength among Greco-Roman wrestlers were obtained in the III measurement (6 month later) no significant differences were found between I (at the beginning) and II (after 3 month) measurements ( $P > 0,05$ ) (Table 1)

**Table 2. Measurement of grip, back and leg strength of freestyle wrestlers (kg)**

Timings	Right grip strength (Mean± sd)	Left grip strength (Mean± sd)	Leg strength (Mean± sd)	Back strength (Mean± sd)
<b>Measurement I. (at the beginning)</b>	49,45 ± 5,51 <sup>A</sup>	46,53 ± 2,66 <sup>A</sup>	155,35 ± 21,2 <sup>B</sup>	166,05 ± 21,21 <sup>A</sup>
<b>Measurement II. (after 3 month)</b>	51 ± 3,95 <sup>A</sup>	47,12 ± 2,3 <sup>A</sup>	168,7 ± 16,34 <sup>A</sup>	160,4 ± 16,98 <sup>A</sup>
<b>Measurement III. (after 6 month)</b>	50,73 ± 5,47 <sup>A</sup>	46,86 ± 3,35 <sup>A</sup>	172,15 ± 15,28 <sup>A</sup>	167 ± 18,67 <sup>A</sup>

A,B,C: : The difference between the meanings of different letters in the same column is significant ( $P < 0,05$ )

In the research, during the analysis of strength measurements conducted in 3 different time periods (at the beginning, after 3 month and after 6 month) the results of left and right grip strength did not reflect any statistical differences according to

measurement time ( $P > 0,05$ ). As for the evaluation of leg strength measurements of wrestlers, the results of II and III measurements were found to be significantly higher ( $P > 0,05$ ), than I measurements having similar outcomes ( $P < 0,05$ ) (Table 2)

**Table 3. Judokas' right - left grip and back and leg strength measurements.(kg)**

Timings	Right grip strength (Mean± sd)	Left grip strength (Mean± sd)	Leg strength (Mean± sd)	Back strength (Mean± sd)
Measurement I. (at the beginning)	51,62 ± 4,13 <sup>A</sup>	49,61 ± 3,01 <sup>A</sup>	169,3 ± 19,96 <sup>B</sup>	165,65±13,24 <sup>B</sup>
Measurement II. (after 3 month)	53,85 ± 6,29 <sup>A</sup>	47,87 ± 3,4 <sup>A</sup>	182 ± 55,02 <sup>A</sup>	167,25 ± 8,1 <sup>B</sup>
Measurement III. (after 6 month)	53,51 ± 4,95 <sup>A</sup>	48,99 ± 2,8 <sup>A</sup>	177,5 ± 15,15 <sup>A</sup>	172,9 ± 8,36 <sup>A</sup>

A,B,C The difference between the meanings of different letters in the same column is significant ( $P < 0,05$ )

In our study, it was determined that the right-left grip strength of the judokas' according to measurements made in 3 different time period (at the beginning, after 3 month and after 6 month) were similar ( $P > 0,05$ ). The lowest and meaningful leg and back strength levels of the athletes were obtained at the first measurement ( $P < 0,05$ ). There was no

statistically significant difference between II and III leg strength measurements ( $P > 0,05$ ). While the highest value ( $P < 0,05$ ) in back strength measurements were obtained in the III measurement, II and II measurements had statistically same values ( $P > 0,05$ ). (Table 3)

**Table 4. Right-left grip and back and leg strength measurements of athletes.**

Timings	n	Right grip strength (Mean± sd)	Left grip strength (Mean± sd)	Leg strength (Mean± sd)	Back strength (Mean± sd)
Measurement I. (at the beginning)	8(M)	46,7 ± 5,67 <sup>A</sup>	45,34 ± 4,37 <sup>A</sup>	137,71 ± 14,02 <sup>B</sup>	136 ± 20,72 <sup>A</sup>
Measurement II. (after 3 month)	8(M)	47,71 ± 6,5 <sup>A</sup>	45,32 ± 3,54 <sup>A</sup>	141,71 ± 13,91 <sup>B</sup>	133,79 ± 23,87 <sup>A</sup>
Measurement III. (after 6 month)	8(M)	48,46 ± 5,17 <sup>A</sup>	47,64 ± 8,93 <sup>A</sup>	150,14 ± 11,82 <sup>A</sup>	140,64 ± 26,14 <sup>A</sup>
Measurement I. (at the beginning)	3(F)	31,26 ± 2,87 <sup>A</sup>	31,3 ± 3,55 <sup>A</sup>	109,17 ± 32,46 <sup>A</sup>	107,33 ± 27,15 <sup>A</sup>
Measurement II. (after 3 month)	3(F)	33,63 ± 2,41 <sup>A</sup>	32,03 ± 2,75 <sup>A</sup>	108 ± 33,64 <sup>A</sup>	87 ± 26,75 <sup>A</sup>
Measurement III. (after 6 month)	3(F)	35,5 ± 2,35 <sup>A</sup>	32,66 ± 2,44 <sup>A</sup>	114,67 ± 27,02 <sup>A</sup>	87 ± 26,75 <sup>A</sup>

A,B,C: The difference between the meanings of different letters in the same column is significant ( $P < 0,05$ )

In this study, measurements of right- left grip and back strength of athletes that is performed in 3 different times within the group (at the beginning, after 3 month and after 6 month) were evaluated and no statistical difference was identified ( $P > 0,05$ ). During the evaluation of leg strength, all

values of female athletes were similar ( $P > 0,05$ ). At the same time, the highest and significant value of leg strength ( $P < 0,05$ ) among male athletes were identified in III measurement ( after 6 month) and no difference between I and II measurements was found ( $P > 0,05$ ). (Table 4)

### Discussion

While low repetitions with high resistance is performed to increase the muscle strength, high repetitions with low resistance should be done for the development of muscle endurance. Strength likely causes the cross-sectional area of muscle to

enlarge, at the same time is increased simultaneously with the load that muscle fiber can lift. As a result, the increase in muscle mass is occurred according to the total body ratio of athletes. This increase will provide a great advantage for the athletes to overcome and be

adaptive in high resistance trainings and competitions. Moreover, the numbers of myofibril, sarcomere and motor units also will be increased.

In the evaluation of measurements of right-left grip strength of Greco-Roman style wrestlers performed in 3 different times( at the beginning, after 3 month and 6 month) within the group any statistically significant difference was not found. While the highest value of leg and back strength was obtained at III measurement (6th month), no significant difference was found between I (initial) and II (3<sup>rd</sup> months) measurements. The highest values of leg and back strength obtained in the measurements are appeared as a positive indicator of strength trainings done during 6 months.

In their researches conducted to describe various motor skills of wrestlers on different weight category Basar et al. (2014) found out that among national and international athletes aged 17-21 the average back strength of Greco roman wrestlers was 138,1 kg and of freestyle wrestlers was 129,4.kg.In the same study, the leg strength of the Greco-Roman wrestlers was found to be 203.2 kg while the leg strength of the free style wrestlers was 193.1 kg. Kaya (2015), who examined the effects of 8 week plyometric training technique on the wrestlers in his research with 37 participants found that in the last measurements, the mean value of the back strength was 139,35±22,59 kg, the right grip strength was 46,95±6,94 kg and the left grip strength was 46,74±6,14 kg. Garsia Pallers et al. (2011) revealed that the back strength of middleweight elite wrestlers was 136.3±14.6 kg, while the grip strength was 53.1±7.8 kg in dominant hand and 49.1±8 kg in non-dominant hand. The results of the force parameters obtained in the Greco- Roman and Freestyle wrestlers are partially similar to the literatures at the same time they are contradictory in part. It can be said that, this contradiction may be due to the wrestlers' age, training level and applied training programs.

In our study, during the analysis of intra-group strength measurements of Judokas in 3 different time periods (initial, 3 month, and 6 month later) the measurements of right and left grip strength were similar. Whereas the lowest and significant value of leg strength was gained at the I measurement, any statistical difference was not detected between II and III measurements. As for the back strength measurements, the highest and significant values were determined at the first measurement, while the second and the third measurements showed identical values. While the highest values of leg and back strength gained during the I and II measurements were being evaluated as the positive result of 3- month trainings the same effect was not detected at the III measurement. In their research performed to identify the level of Judokas' performance Nitekim

Drid et al. (2015) measured the grip strength of 5 international level and 5 national(Serbia and Bosnia and Herzegovina) level athletes and found that the right grip strength of international level athletes reached 69 kg and left grip strength was 64,3 kg. For national-level athletes, the right grip strength found to be 62.6 kg and the left grip strength was 58.2 kg. Moreover, in his survey Çınar et al. (2009) measured the leg strength of the Turkish and Ukrainian national boxers aged 20 years using back-lift dynamometer and gained 117,95±35,70 kg for Turkish and 113,96±17,11 kg for Ukrainian athletes. Aslan et al. (2011) in their analysis conducted on athletes of High school of Physical education and Sport determined the results of measurements performed with back-lift dynamometer as 143.16±27.44 kg. In this work the grip strength values of Kyrgyz Judokas appears to be lower than the results of Drid et al. (2015). This shows that the judo athletes of Kyrgyzstan are not at a sufficient level in terms of maximum strength training. Especially, the similarity of leg and back strength values at the II and III measurements may indicate to the lack of increase in the intensity of training of judo athletes.

In this research, in the evaluation of right-left grip strength and back and leg strength measurements in 3 different times (at the beginning, after 3 month and after 6 month) no significant change was found between right and left grip strength of male and female athletes, while an increase in back and leg strength was detected. However, this increase was found to be insignificant in terms of back strength. It is clear that the changes in force parameters of athletes during 6 month are insufficient. In his 90 degrees Squat testing Storen et al. (2008) found the average of group of 4 male and 5 female athletes as 97,8±21,3 kg. Costal et al determined the left grip strength of 9 of 15 male triathlon athletes as 47.75±6.41 kg and the right grip strength as 50.00±5.42 kg while the left grip strength of other 6 athletes reached 47.25±9.00 kg and left grip strength 47.17±6.56 kg. In his study Akcakaya (2009) measured the grip strength of 15 male athletes from Trakya University who compete in the branches of football, basketball and athletics and identified the value of right hand strength as 44.85±6.50 kg for football 44.16±8.08 kg for basketball and 42.60±5.97 kg for athleticism. For the left hand strength, 40.87±7.16 for football, 44.36±6.09 for basketball and 38.85±6.23 for athletics was found. In this study, the strength values of athletes are partially similar to the literatures at the same time they are contradictory in part. However, in general, the strength of athletes appears to be lower than in the literatures. This shows us that the strength measures of participating athletes are not sufficient and that Kyrgyz athletes

will not be able to perform adequately in international competitions. In particular, it can be said that Kyrgyz athletes did not properly execute maximal strength exercises.

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