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ORIGINAL ARTICLE

The Effect of 8-Week Core Training on Running Based Anaerobic Sprint Ability of Footballers

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ABSTRACT

Aim: The aim of this study was to examine the effects of 8-week core strength training on the repetitive sprinting ability, anaerobic power, body mass and fatigue indexes of football players.

Methods: 15 male football players who play football regularly participated in the study. A core strength training program was applied to the research group using BOSU (Theraband, USA) elastic band (Theraband, USA). Before and after the study, the participants were analyzed with Tanita BC418 and their Body Mass Indexes (BMI) were taken. The height of the participants was measured with a stadiometer with a sensitivity of 0.01 cm. The data were analyzed using the SPSS 22 package program. Paired T Test was used for pre-test and post-test comparison between the two groups as the data showed normal distribution.

Results: A high level of significant difference was found in the RAST and BMI values of the participants before and after the training when the averages were compared ($p<0.05$). A high level of significant difference was found in the Maximal Power and Fatigue Index values of the study participants when the pre- and post-training averages were compared ($p<0.05$).

Conclusion: As a result, 8-week core exercises with Bosu and Tera tape improved the ability of repetitive sprinting, which is one of the important features of football players. As a result of the study, it can be said that the BMI level of the football players increases with the muscle mass developed as a result of core training.

Keywords: Repeated Sprint, Fatigue İndex, Core Strength, Anaerobic Power, Maximal Power

INTRODUCTION

Physiological and physical demands are necessary for optimal performance in all age groups (adults, juniors and juniors) of today's football. These physiological and physical demands include high-level (such as sprinting, jumping, changing direction, shooting), moderate-intensity (jogging) and low-level (such as walking) movements. These demands are affected by the players' position, skill levels, game style and team tactical strategies.[1,2] The tactical part of football is developing immensely. Along with this development, the field of training and physical condition plays a very important role in football. Time reaction, strength and skill are the most important skills that lead to success.[1,3] Speed performance has come to the fore as the players are more effective and change direction frequently during the football match. Match analyzes show that sprints occur frequently during the match and the most occurring sprints are at distances less than 20 meters.[4] They state that during a competition period, 2 and 4 second sprints occur for every 90 seconds, and the sprint covers 3% of the game time and between 1% and 11% of the distance during a match. Approximately 96% of sprints are shorter than 30m and 49% are shorter than 10m. Thus, performance at distances above or below 10 m and speed achieved in the first step are key indicators of player potential. In addition, a match includes a lot of explosive movements and requires approximately 15 steals and 10 headshots, frequent ball hits and different distance speeds (Chelly et al., 2010; Sarıakçalı et al. 2022).[5,6] Historically, it has been difficult to investigate the ability of repeated sprinting in field-centered team sports due to the unpredictability of the movements of the players during the competition. However, advances in technology allow researchers to document detailed movement patterns (time-motion analysis) of team athletes. Studies that published time-motion analysis in field-centered team sports competitions reported that average sprints occur between 10 and 20 meters distance and 2 to 3 seconds.[7] Various studies have reported that high-level soccer players perform higher-intensity jogging than lower-level players during a soccer game. Thus, determining the repetitive sprint ability of players in sports branches where more than one sprint occurs is considered an important performance measure.[8,9,10] Previous studies have revealed that very successful teams in today's football have the ability to perform more repetitive high-speed movements than less successful teams.[11,12,13]

The core region consists of bones, discs, ligaments and muscles. The core can be defined as the trunk or the region that provides the connection between the lower knees and the sternum.[14] The muscles in the core region consist of the pelvis and trunk muscles. In some studies in the literature, the core region muscles consist of all the muscles located between the sternum and the knee. Core muscles have an important role on body posture.[15,16] The effects of core strength exercises have been investigated by many people and it has been concluded that the athletes improve their motor skills, contribute to body balance, prevent injuries, and increase the performance and strength of the athlete. Strength training for the core region is especially beneficial for athletes.[14,17] It is important to develop core strength and power in order to provide better performance in the sports branch. Increasing core stabilization is the basis for increased force production in the lower and upper extremities. However, it does not mean that the increase in core strength will always positively affect the sportive performance.[15] When we look at the literature, positive and significant results were not found in some studies.[18] There are many types of exercises that cover the core muscles. In recent years, core exercises have become a fundamental part of the training. The type of exercise that is done according to the body weight, height, age of the person and aims to strengthen the muscles that provide the balance of the spine is called core training. This training affects the strength and stabilization of regional and superficial muscles. With core training exercises, the balance of the body can be improved, and the risk of injury can be reduced with the strengthening of the muscles.[19] Core training is done for two purposes. The first is done to increase performance and improve strength. Secondly, it is performed for the purpose of preventing injuries or post-injury treatment. There are many different types of core exercises. When the studies on the subject are examined, it is seen that there are varieties of core exercise. Some of those; Bridge exercise, tummy tuck exercise, heel press squat exercise, cobra exercise, bike tummy tuck exercise, tummy tuck exercise with fitness ball, upright tummy tuck exercise, reverse tummy tuck exercise, long arm tummy tuck exercise, side abdominal compression exercise to name a few. There are more varieties.[14]

The aim of this study was to examine the effects of 8-week core strength training on the repetitive sprinting ability, anaerobic power, body mass and fatigue indexes of football players.

MATERIAL AND METHODS

Participants of the Study: 15 male football players who play football regularly participated in the study. Age of the football players was 19.46±1.30 years, age of the athlete was 7.32±1.89 years, height was 178.00±6.98 cm, and body weight was 72.20±5.68 kg. Informed consent for their voluntary participation was obtained from the athletes. A core strength training program was applied to the research group using BOSU (Theraband, USA) elastic band (Theraband, USA). Before and after the study, the participants were analyzed with Tanita BC418 and their Body Mass Indexes (BMI) were taken. The height of the participants was measured with a stadiometer with a sensitivity of 0.01 cm.

Core Training Protocol: Athletes using BOSU and elastic band (Theraband, USA) (blue color with 7.5lb resistance); They were included in a program consisting of 7 stations, 3 days a week, 40 minutes a day for 8 weeks. The content of the training program consists of "Sidelying balance, Push-up, Supine trunk curl and pelvic tilt, Side bridge, Curl-up, Prone platform push-up, Lateral hip lift" movements. Working time: 1st and 2nd weeks 30 sec x 3 sets, 3rd and 4th weeks 40 sec x 3 sets, 5th and 6th 7th 8th week 50 sec x 3 sets, medium speed, fluent tempo, full interval between stations It is a "core" strength training program with a circular method with rest without rest and 2 minutes of active rest between sets.[20]

Body Mass Index (BMI): The BMI values of the participants were obtained by dividing the body weight (kg) by the square of the height (in m) (BMI=kg/m2).

Running Based Anaerobic Sprint Test (RAST): Repeated sprint performances were tested with a computer-connected Newtest 300 (Finland) test battery photocell system. The power values of the repeated "sprint" test were calculated automatically by the software program. The athlete was asked to run the 35 m distance 6 times at maximum speed. A rest period of 10 seconds was given for every 35 m distance. Each 35 m that the participant ran was recorded as (0,01) sec. Maximal Power: Calculated from the formula Power (Watt)=Weight (kg)xDistance2 /Time3 (sec) and Fatigue Index - (Maximum power - Minimum power) ÷ Total time for the 6 sprints. The maximum strength and fatigue index of 6 rounds were evaluated.[13,20,21]

Statistical Evaluation: The data were analyzed using the SPSS 22 package program. The data of the participants' age, body weight and height variables were analyzed descriptively. Shapiro Wilk test was used for the normality tests of the values taken from the data, since the sample group was smaller than 50. Paired T Test was used for pre-test and post-test comparison between the two groups as the data showed normal distribution. Statistical values were evaluated at 95% confidence interval and at $p<0.05$ and $p<0.01$ significance levels.

RESULTS

Table 1: Comparison of participants' RAST and BMI before and after training

Variables	'x̄'±SD	Variables	'x̄'± SD	t	df	p
Pre BMI	22,76±0,75	Post BMI	22,85±0,78	-4,662	14	0,0001
Pre Rast 1	4,79±0,15	Post Rast 1	4,64±0,17	5,335	14	0,0001
Pre Rast 2	4,96±0,13	Post Rast 2	4,82±0,14	8,966	14	0,0001
Pre Rast 3	5,15±0,21	Post Rast 3	5,05±0,18	3,862	14	0,002
Pre Rast 4	5,43±0,33	Post Rast 4	5,30±0,25	3,862	14	0,002
Pre Rast 5	5,74±0,38	Post Rast 5	5,60±0,34	4,845	14	0,0001
Pre Rast 6	6,06±0,43	Post Rast 6	5,93±0,38	3,534	14	0,003
Pre Rast Mean	5,35±0,26	Post Rast Mean	5,22±0,23	6,825	14	0,0001

When we look at Table 1, a high level of significant difference was found in the RAST and BMI values of the participants before and after the training when the averages were compared ($p<0.05$).

Table 2: Comparison of the participants before and after the Maximal Power and Fatigue Index training

Variables	'x̄'±SD	Variables	'x̄'±SD	t	df	p
Pre Maxımal Power	811,00±115,26	Post Maxımal Power	901,20±140,81	-5,502	14	0,0001
Pre Fatıgue Index	12,51±2,17	Post Fatıgue Index	14,75±3,25	-3,364	14	0,005

When we look at Table 2, a high level of significant difference was found in the Maximal Power and Fatigue Index values of the study participants when the pre- and post-training averages were compared ($p<0.05$).

DISCUSSION AND CONCLUSION

In this study, the effects of core strength exercises applied to male football players using Bosu and elastic bands for 8 weeks on anaerobic power, fatigue index and repetitive sprint parameters were investigated. As a result of this study, it was concluded that the core training program improved the "anaerobic power, body mass index, fatigue index and repetitive sprint parameters" in football players. It was observed that the RAST times taken before the study decreased positively at the end of the core training. In addition, it was observed that BMI, maximal power and fatigue index values increased as a result of core training. Similarly, Kafa et al. (2020) investigated the effects of "core" strength exercises applied to adolescent male basketball players using BOSU and elastic band for six weeks on "core" muscle endurance, balance, agility and anaerobic power parameters. As a result of their study, it was determined that the "core" training program not only increased the "core" muscle endurance in basketball players of this age group, but also improved the parameters of balance, agility and anaerobic power.[20] Sever and Zorba determined that the 8-week static and dynamic "core" exercise program applied to football players had a positive effect on the development of "core" muscle endurance.[22] Doğan, Mendeş, Akcan, and Tepe (2016) investigated the effect of 8-week core training on the physical and physiological parameters of football players and measured body composition, leg strength, back strength, flexibility, and vertical jump. When the pre-test and post-test values of the training group were compared, a significant improvement was observed in all parameters. When the pre-test and post-test values of the control group were compared, a significant improvement was observed in BMI, body weight, vertical jump, leg and back strength values. In the differences between the groups; weight, BMI, flexibility, leg and back strength were found to be significant in favor of the study group.[23] Tural et al. (2021) found a significant difference in the pre- and post-training back strength, height and BMI variables of the 8-week core exercises on the wrestlers. There was no significant difference in weight, reach, leg, right and left grip and core strength before and after strength training.[24,34,35] Studies show that exercises performed on unstable surfaces increase core muscle strength more than the same exercises performed on stable surfaces. When we look at the literature, applications for improving core muscle strength, core stability or core muscle endurance by using unstable surfaces such as SwissBall, BOSU balls, Wobble

boards attract attention.[20,25,26,27,28,32,33] In the research conducted on basketball players, the preference of exercises performed on an unstable surface such as BOSU, increased the endurance of the "core" muscle, and as a result, the development of anaerobic power and agility.[20] In this study, similar findings were found in football players who had a core exercise program similar to Kafa et al. In this study, performing the exercise on an unstable surface such as Bosu for 8 weeks may have caused the improvement of the repetitive sprint, anaerobic power and fatigue index of the football players.

When we look at the studies on anaerobic power and core training of football players; In the study conducted by Iri et al. (2021), a significant difference was found in the variables of cooper, 20 m sprint, vertical jump, agility, body fat percentage and anaerobic power in the comparison of the pre-test and post-test results of the football players in the core training group.[29] Özgül (2019) examined the effect of 8-week core and plyometric training on some motoric features in his study on football players. As a result of the study, they stated that the core and plyometric exercises applied improved 30 m speed, agility and vertical jump performance, and the applied training program had a positive effect on motor performance and body composition.[30] Şimşek (2019) found in his study on football players that 8-week core and plyometric training reduced body fat, and improved muscle mass, anaerobic power, motoric and technical skills.[31]

As a result, 8-week core exercises with Bosu and Tera tape improved the ability of repetitive sprinting, which is one of the important features of football players. As a result of the study, it can be said that the BMI level of the football players increases with the muscle mass developed as a result of core training.

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