



Does Once-a-Week Boxing Training Improve Strength and Reaction Time?

Evrım Çakmakçı¹, Ali Tatlıcı², Salih Kahraman³, Sercan Yılmaz⁴, Bünyamin Ünsal⁵, Ceylani Özkaymakolu⁶

Abstract

Aim: In the aim of this study is to examine the effects of 12-week boxing training once a week on some physical parameters.

Material and Methods: In the study, 13 recreation students (age 19.04±8.15 years, weight 66.75±6.85kg, height 175.46±4.44cm) were participated. First of all, the height and weight measurements were taken, and then biceps diameter measurements were done to participants. After anthropometrics measurements, a standard 15-minute warm-up protocol was applied before the measurements followed by tests. Lastly standard 30 seconds push-up test, passive bar hang, right and left hands reaction time were applied to participants. Basic boxing training was given to the volunteers for a total of 2 hours per day in a week for 12 weeks. After the 12-week boxing training program, the second measurements were made under the same conditions again and recorded.

Results: The result of the study is that it was found that there was a significant change in some parameters of the individuals who did boxing training 1 day a week. A significant difference ($p<0.05$) was found in the right biceps' diameter of the group and the reaction time of the right hands of the group. Only a significant difference in the right arm was seen, it can be caused the majority of the group was right-handed.

Conclusion: 12-week boxing training period was increased the number of push-ups and passive bar hanging times. As a result, one-day boxing training in a week for 12 weeks can improve individuals' abilities.

Keywords

Boxing,
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INTRODUCTION

Boxing is a sports branch which requires dynamic and static features. Also, it is complex structured and needs strength (Soslu et al., 2018). As a full-contact martial arts game, it is possible to throw a clear and accurate punch to the opponent without getting a punch in the face of amateur boxing intent (Guidetti, Musulin, & Baldari, 2002). In an amateur boxing match, competitors are allowed to use their glove's fingertip area and their punches toward the target area (i.e., side to side or from the front and above the belt) (Chaabène et al., 2015).

A typical boxing event is held over 3x2 minutes for the novice and 4x2 minutes for the middle boxer, while open-class boxers can take 3x3 or 4x2 minutes rounds depending on the coach's agreement. The intervals between the rounds are usually 1 minute. Boxing fitness components include cardiovascular endurance, muscle strength, muscle endurance, flexibility, and body composition. Skill-related components include speed, agility, strength, balance, coordination, and response time. Most combat sports require a mix of technical, strength, aerobic fitness, power and speed. Often a single performance feature is not dominant in martial sports. The physiological responses, especially the heart rate and the maximum oxygen uptake (VO_2max), the blood lactate values vary even according to the weight category and the rounds (Slimani et al., 2017).

Since the boxing weight class is a fighting sport, optimizing the body composition of boxers is considered appropriate for high-level competitive performance (Bagchi, Nair & Sen, 2013). Before each match, the athlete tries to fit a mass body limit by maximizing the lean mass and reducing the amount of body fat to a minimum (Franchini, Brito, & Artioli, 2012; Morton, Robertson & Sutton, 2010). Muscle strength can be defined as the ability to produce the highest amount of force in the shortest time possible.

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¹ Selcuk University, Faculty of Sport Science, Coaching Education, Konya/Turkey, evrimcakmakci@selcuk.edu.tr 0000-0002-1834-742X

² Selcuk University, Faculty of Sport Science, Physical Education and Sport, Konya/Turkey, alitallici@selcuk.edu.tr 0000-0001-6346-0010

³ Selcuk University, Faculty of Sport Science, Physical Education and Sport, Konya/Turkey, salih.khrmn1453@gmail.com 0000-0003-2949-326X

⁴ **Corresponding Author:** Selcuk University, Faculty of Sport Science, Physical Education and Sport, Konya/Turkey, sercanyilmaz@selcuk.edu.tr 0000-0001-6820-6708

⁵ Selcuk University, Faculty of Sport Science, Coaching Education, Konya/Turkey, bnymn0012@gmail.com 0000-0002-0716-082X

⁶ Selcuk University, Faculty of Sport Science, Physical Education and Sport, Konya/Turkey, ceylanio@hotmail.com 0000-0003-2537-9080

The punching action required for boxing needs to take place in the fastest and strongest way. The energy system used for punching is a swift and short action, it is a high energy phosphate system (Piorkowski, Lees & Barton, 2011). The loading and resting rates can be expressed in 3x3, 4x2, 3x2 minutes in the order of 9: 2, 8: 3, 6: 2 according to 3 different boxing event formats. Such movements of load and resting require well-developed anaerobic performance (Davis, Leithäuser & Beneke, 2014). Ghosh (2010) reviewed many studies in his review and consequently, boxing matches were met by aerobic and anaerobic energy systems.

In this research; it was aimed to determine the effects of individuals who began boxing training recreationally on physical parameters after 12 weeks of boxing training.

METHOD

Participants: In this research, 11 men (right handed) and four women (2 right and two left-handed) who are studying at Selcuk University Sport Science Faculty and whose average age were between 19-25, weight $66,75 \pm 6,85$ kg, body mass index $22,22 \pm 2,13$ kg/m² healthy recreational individuals participated as volunteers. At the beginning of the study, each of the subjects was given detailed information about the risks and discomforts that may be encountered with the study. The investigation began with 15 individuals but 1 male and 1 female could not finish the training period so 13 subjects finished the study.

Training Program: Basic boxing training was given to the volunteers for a total of 2 hours per day in a week. In primary boxing education; guard posture, stepping, punch (pole, hook and uppercut) fent, eskiv, rope jump, coordination and sparring techniques, and coordination endurance parameters have been developed.

After the 12-week boxing training program, the second measurements were made under the same conditions again and recorded.

Hand reaction time: The visual hand reaction values of the participants were measured using the electronic reaction time meter Newtest 1000. In the study, all participants' dominant hand was the right hand. In related test was conducted in an environment where no noise components could disturb the attention of the participants for the trial. Participants were asked to sit on a chair in front of a table where reaction time test equipment was put. During the test, the sitting height of the individual was arranged according to his/her height where his/her hands were in an ergonomic position. The preferred finger of the subjects was put on the reaction time test equipment and they were asked to push the button when they see the light. Before the test, 5 repetition exercise tests were applied. Participants pushed the bottom 5 times for each hand then the other hand was measured. 5 repeated measurements of all participants were taken and the best and worst values were taken out and the arithmetic mean was calculated.

30 seconds Push-Up Test: 30 seconds push-up test: On the gymnastics mat on the participant floor, the arms were open at the shoulder width, the elbows were stretched, the knees do not touch the floor and the waist area do not fall down. Together with the start command, the participant moved the body closer to 90 degrees and returned to the starting position. In this way, the test was continued for 30 seconds and the value of the participant at the end of the test period was recorded as the test score.

Passive bar hanging: The participants were held in the bar with their arms stretched. The participant was asked to grasp the bar with his hands from above and release his/her body. Shaking of the body, bending the knees, shaking the legs does not allow. Participants were asked to hold the bar as long as they can.

Experimental Design: Participants came to the boxing hall for the first measurement. At 15:30 the first measurements started to be taken. A standard 15-minute warm-up protocol was applied before the measurements followed by tests. After the 15 minutes, warm-up was completed, the height measurement, weight, biceps diameter measurements, number of push-ups, passive bar hang, right and left-hand visual reaction times were taken. After tests, participants started to training period for a day a week during 12 weeks. Participants were asked to arrive at the boxing hall two hours before each test, entirely rested and with the water requirement removed. Participants were informed that they had not exercised 24 hours before the measurement day.

Analysis of Data: The data were analysed using the SPSS (Version 22.0) program. Paired T-test was performed to determine the difference between pre and post-test. The significance level was evaluated as $p < 0.05$.

RESULTS

Table 1. Comparison of Pre and Post-test parameters of participants.

Variables	Pre-test Mean±SD	Post-test Mean±SD	p
Age (yr)	19.04±8.15	19.04±8.15	
Height (cm)	178.00±11.09	178.00±11.09	
Body Weight (kg)	66.75±6.85	67.40±6.28	0.31*
Body Mass Index (kg/m ²)	22.22±2.13	22.43±1.80	0.265
30 sec Push-up	23.15±14.04	29.15±16.43	0.013*
Passive bar hanging (sec)	59.77±18.57	79.30±25.77	0.001*
Left Hand Reaction (sec)	0.2619±0.027	0.252±0.017	0.211
Right Hand Reaction (sec)	0.266±0.03	0.245±0.015	0.012*
Left biceps circumference (cm)	31.03±2.45	31.34±2.74	0.373
Right biceps circumference(cm)	31.03±2.45	31.92±2.82	0.003*

Significance level (*) $p < 0.05$.

The result of 12-week boxing training, there were no significant changes in body weight, body mass index values. When the reaction times were analysed, it is seen that left-hand reaction time improves but not significantly on the other hand right-hand reaction time decrease significantly. In addition, there was a significant increase right biceps circumference measurement, but left biceps circumference values were not improved significantly. Strength parameters; 30-sec push-up values and passive bar hanging time significantly improve after a day boxing training for 12 weeks.

DISCUSSION

In this study, it was examined whether one-day boxing training improves the strength and visual reaction times. The result of the study showed that right-hand reaction time improved significantly. Muscle strength can be defined as the ability to produce high amounts of force as soon as possible. The punching action required for boxing must be the fastest and strongest. Because the punch is a very fast and short movement, the energy system used is a high-energy phosphate system (Piorkowski et al., 2011). Therefore, it was expected that boxing can improve reaction times and the participant's speed. However, the only significant improvement was found in the right-hand reaction time. It could be resulted from that 13 participants were right handed so maybe right arm was used much more than nondominant. The present study group was not homogeneous about in the dominant hand, and it is said that homogenous groups can give better results (Işık, Ünlü, Gözübüyük, Aslanyürek, & Bereceli, 2018). Faigenbaum et al., (2002) examined one or two days a week training effects on strength in children. Twenty-one women and thirty-four men were participated in to study. The participants were divided into 2 groups (once-a-week training and twice-a-week). 1RM chest value was significantly increased in 2 days training group. Leg press was importantly increased in both groups but not in the control group. Grip strength, long jump, vertical jump, and flexibility were not statistically increased in both groups.

In the present study, it was found that there was no important improvement in left biceps circumference while 30-sec push-up, passive bar hanging, and right biceps parameters were significantly increased. Boxing is the mode of spreading of intermittent and short-term high-explosive activities between lower intensity activities. The ratio of activity to rest can be given as 3: 1. The loading and resting rate can be expressed as, 4x2, 3x2 minutes, 9: 2, 8: 3, 6: 2 according to 3 different boxing competition formats. Such overload and resting movements require a well-developed anaerobic performance (Davis et al. 2014). Ghosh (2010) studied several studies in his review and found that aerobic and anaerobic boxing matches were energy systems. He emphasized that this result was reached by parameters such as VO_2 max with lactate accumulation. In the present study, the training program was set as 3 min work 1 min rest. Therefore, the participant's anaerobic power and strength endurance

were expected to improve. However, left biceps circumference did not significantly increase, it is thought that passive bar hanging, 30-sec push-up improve so maybe left arm active motor-unites number increase (Ünlü & Koçak, 2018). Cheema, Davies, Stewart, Papalia, & Atlantis (2015) were studied that compare the effect of boxing training and walking in obese adults. 12-week boxing training and walking were carried out to participants. After 12 training period, body fat rate and VO₂max values significantly improved. In El-Ashker & Nasr (2012) studies, Egyptian boxers were made eight-week boxing training. Following the eight weeks of boxing training, while heart rate rest was significantly decreased (HR), HR peak was increased considerably. Also, VO₂max significantly increased after eight weeks of boxing training. After literature scanning, we could not find smiler studies with the present study. Karakurt (2017) studied on boxers about band exercise. Dynamic and static group leg strength was significantly increased. Bruzas, Kamandulis, Venckunas, Snieckus & Mockus (2016) examined the effect of plyometric training on punching power, but they could not find significant improvement.

CONCLUSION

Once-a-week boxing training can be improved physical performance. So, people who have limited time for exercise can exercise once to not loss physical performance and gain muscle.

PRACTICAL APPLICATIONS

In the future study different exercise type and different training frequency, be investigated.

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