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Acute Effects of Myofascıal Release Exercıse Periods on Circulatory Parameters in Young Archers

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Abstract: The aim of this study was to investigate the acute effects of different myofascial release exercise durations on heart rate, saturation and blood pressure values in young archers. For this purpose, a total of 12 young athletes aged 16-18 years were included in the study. Myofascial release exercises using foam rollers were applied to the participants on different days. The inclusion criteria were determined as being healthy, not having a chronic disease, not having any medication used continuously and being interested in active archery sport. Control (T1), experimental (T2), and experimental (T3) foam rollers for 30 seconds and 60 seconds, respectively, were applied to the young archers on different days and heart rate, SpO2 levels and blood pressure values were measured after the applications. SPSS 22.0 programme was used to analyse the data obtained. One-way analysis of variance and LSD tests for repeated measures were performed to determine the difference between the groups of the application results. As a result of the analysis, no statistical significance was found in the saturation values, diastolic and systolic blood pressure values of the groups ($p>0.05$). There was statistical significance between T1 and T3 groups in the heart rate in favour of T3 ($p<0.05$). Myofascial release exercises affected the heart rate in terms of the parameters evaluated in long-term applications. It can be said that this change is a result of the energy and effort expended.

Keywords: Blood pressure, Exercise, Relaxation, Archery

Introduction

Archery stands out as a sport branch that has attracted the attention of mankind throughout history and has achieved great success today. This ancient sport attracts the attention of sports enthusiasts around the world with its advanced performance and technical skills, and also allows athletes to demonstrate their high level of physical and mental abilities. The essence of archery is a performance based on shooting arrows with high accuracy at a specified target within a limited time. This sport has a static character and requires intense strength and endurance of the upper body muscles. Archery includes the actions of traction technique, aiming and release techniques applied to the shooter in certain phases. The shooter carries the bow with the tense shooting arm with the muscles that keep the body posture stable during the shot and completes the movement by pulling the bowstring dynamically with the traction arm. After this moment, with the sound of the clicker, the archer completes and finishes the shot by releasing the bowstring (Behm et al.,2004; Fletcher & Jones, 2004; Fletcher & Anness, 2007; Gelen, 2017; Yonal & Turkmen, 2017; Aktepe, 2012).

This sport has a challenging process for top level athletes. Elite level archers have to maintain strong muscles and well-balanced upper body stability in this phase, which includes static and dynamic contractions. This process pushes the athletes to their limits, both physically and mentally, and encourages them to reach their best performance. In conclusion, archery, as both an ancient and contemporary sport, offers an experience that requires a combination of discipline, focus and technical skills. This sport has been recognised as a traditional

art throughout history and has maintained its value as a part of modern sport (Behm et al.,2004; Fletcher & Jones , 2004).

The warm-up process usually starts with aerobic running of increasing intensity starting at moderate levels. After moderate intensity, athletes move on to static stretching exercises. However, a number of studies have shown that warm-up movements at this level may negatively affect performance by decreasing the power, speed and force production of static and dynamic stretching exercises performed before, after training, before or after competition (Behm et al., 2004; Fletcher & Jones 2004). On the other hand, some researchers have reported that voluntary stimuli applied from moderate to high intensity, such as dynamic warm-up before sportive activity, may increase strength and performance by activating nerve-muscle function (Behm et al., 2006; Burkett et al., 2005; Fletcher & Anness, 2007; Gelen, 2017; Unlu et al., 2023). In the light of these data, the aim of this study was to investigate the acute effects of different myofascial release exercise durations on heart rate, oxygen saturation and blood pressure values in young archers.

Method

Participants and Study Design

Individuals who regularly participated in a private archery centre and attended training three days a week were included in the study. A total of 12 healthy male individuals between the ages of 16-18 years, who have been actively interested in archery for the last two years, were included in the study in accordance with the study criteria. The study criteria included being interested in archery for at least two years, participating in regular training, having no chronic disease, and not using any supplement or doping substance in the last six months. The researcher visited the subjects at their archery centres four times during the study period. In order to eliminate possible conditions such as physiological, neurophysiological and fatigue, the research protocol was applied to the subjects for three days with a 48-hour break. During the first visit, the participants were given a general information about the study and orientation sessions on the use of materials (foam rollers). In the second visit, age, height and weight measurements were taken and heart rate, saturation and blood pressure measurements were performed as a control practice. In the third visit, in addition to the control application, a 30-second session of myofascial muscle relaxation exercise with foam rollers was applied and measurements were taken. In the fourth and last visit, a 60-second session of myofascial muscle relaxation exercise with foam rollers was applied in addition to the control application and measurements were taken. To minimise the possible effects of circadian rhythm, all treatments were performed at the same time.

Implementation Procedure

All athletes were subjected to a general warm-up procedure before starting training and activities. The purpose of this warm-up was to prepare the body for physical activity, to flex the muscles and to improve performance. In this general warm-up phase, the athletes performed a 5-minute jog run, which raised their energy levels and increased their heart rate. Then, they performed 5 minutes of stretching and stretching movements to prepare their bodies for more mobility. These steps include measures to reduce the risk of possible injury by increasing the flexibility of the muscles. After the completion of the general warm-up, a special warm-up protocol was applied specifically for certain body parts. This protocol for upper and lower extremities aimed to maximise the athlete's preparation for certain movements by pre-activating the muscle groups to be used. In this way, it was aimed for the athletes to optimise their performance and benefit from the training in the best way (Unlu et al., 2023). In the control application, saturation measurements of the athletes were taken in resting and sitting position after general warm-up. Then, heart rate and blood pressure values were measured twice according to a specific test protocol. These controls aimed to carefully evaluate the general health status and physiological responses of the athletes.

Foam Roller Procedure

The foam roller exercises used in the research were preferred by focusing on various parts of the body, upper and lower extremities, posterior and anterior muscle groups in a way that the subjects could apply on their own. The participants applied rolling movements to the selected muscle groups using the foam roller and completed the movement by passing each muscle area from the starting point to the end point. The movement flow determined for each muscle group continued for 30 seconds and then a 20-second transition time was provided

to switch to another muscle group (Healey et al., 2014; Unlu et al., 2023). In this way, while each foam roller exercise continued for a certain period of time, the transition time between muscle groups was also provided in a certain order.

Statistical Analysis

Statistical analysis of the obtained data was performed using the SPSS 22.0 package programme (SPSS for Windows, version 22.0, SPSS Inc., Chicago, Illinois, USA). The analyses presented are expressed as means and standard deviations. The Shapiro-Wilk test was used to assess whether the data were normally distributed. One-way analysis of variance was applied to understand the distribution of the difference between repeated measurement data. LSD correction test statistic was used to determine the difference analyses between the treatments. Statistical significance levels were accepted as $p<0.05$. This value indicates that the results obtained are statistically significant.

Results and Discussion

This study aims to investigate the acute effects of myofascial release exercises using foam rollers. The study was conducted on a total of 12 volunteer athletes who participated in regular training with archery. Myofascial relaxation exercises were applied to the participants with different foam roller application times, and the effects of these exercises on heart rate, blood pressure and saturation levels were evaluated in detail. The data obtained during the research process were supported by tables and graphs, which are visual expression tools, and presented to the readers in a clear and understandable way.

Table 1. Presentation of the values of SPO2 levels

	Mean.±S.D	F	p
T1	96.33±0.89		
T2	96.50±2.11	1.222	0.309
T3	95.67±1.72		

Applications: T1. control treatment T2. experimental treatment 30 seconds T3. experimental treatment 60 seconds, *p<0.05

Table 2. Statistical analysis of heart rate

	Mean±S.D	F	p	Anlamlı Fark
T1	78.50±10.26			
T2	89.00±18.35	4.941	0.026*	T1-T3
T3	90.42±9.41			

Applications: T1. control treatment T2. experimental treatment 30 seconds T3. experimental treatment 60 seconds, *p<0.05

Table 3. Statistical analysis of systolic pressure values

	Mean±S.D	F	p
T1	11.50±0.67		
T2	11.50±1.24	0.478	0.585
T3	11.83±1.03		

Applications: T1. control treatment T2. experimental treatment 30 seconds T3. experimental treatment 60 seconds, *p<0.05

Table 4. Statistical analysis of diastolic pressure values

	Mean.±S.D	F	p
T1	7.50±0.67		
T2	7.42±0.67	0.865	0.421
T3	7.25±0.45		

Applications: T1. control treatment T2. experimental treatment 30 seconds T3. experimental treatment 60 seconds, *p<0.05

Conclusion

This study aims to evaluate the effects of various myofascial relaxation exercise durations performed with foam rollers used in archery sport on saturation, blood pressure and heart rate levels. The study was planned in

accordance with a controlled crossover experiment design. A total of 12 healthy male subjects between the ages of 18-20 years, who have been actively interested in archery for the last two years and who met the study criteria, participated in the study. The subjects were firstly subjected to the control exercise, then to the experimental exercise with foam rollers for 30 seconds and finally to the experimental exercise with foam rollers for 60 seconds. Afterwards, saturation, blood pressure and heart rate levels were measured and a detailed report was made. The main aim of this study was to determine the effects of different durations of myofascial release exercises with foam rollers, which are widely used in archers, on physiological parameters. Controlled crossover experimental design allows for more effective analysis of the data obtained and reliable interpretation of the results. In this context, it is of great importance to evaluate such exercises based on a scientific basis in order to optimise the performance of athletes and improve their post-training recovery processes.

In the results of the study, significance was found at $p<0.05$ level between control and experimental treatments in heart rate. No significance was found between the treatments in saturation and blood pressure values. Keeping the performance at a consistently high level in branches such as archery is a necessity that requires athletes to make intense efforts, to plan their training carefully and to be ready in every aspect. Competing in this sport tests not only physical abilities but also mental strength to a great extent. Athletes require great focus and discipline at every stage, from setting goals, starting training and performing in competitions. Therefore, an increased heart rate can be associated with this.

Nowadays, athletes have to constantly review their training strategies in order to maintain a high level of performance and outperform their competitors. This includes assessing various factors to increase their physical endurance, improve their technical skills and maintain their mental toughness. Training programmes should be customised to suit the individual needs of the athlete, as each athlete has a different performance potential and strengths/deficiencies. Especially in disciplines such as archery, focusing on the target and achieving a perfect shot requires athletes to constantly surpass themselves. This involves a constant endeavour to gain an edge over other athletes in competition. Competing against equally prepared opponents, getting better with each shot and constantly improving by trying different techniques are critical elements for success in the competitive world of archery (Healey et al., 2014; McGowan et al., 2015; Unlu et al., 2023; Yonal &Türkmen, 2017; Aktepe, 2012).

The use of foam rollers or foam roller applications in sports is recommended as an alternative method, which brings with it various advantages. The effects of these applications, such as reducing muscle soreness, delaying muscle fatigue, increasing joint range of motion and providing economy of movement, have the potential to improve the overall performance of athletes. Understanding how these advantages can be used in different sports can help to create optimised training programmes specific to the athlete's needs and discipline. In this context, research to understand how young athletes and amateur athletes can benefit from such applications can shed light on the creation of effective training strategies that appeal to a wide audience in sports. In addition, long-term evaluations of the performance-enhancing effects of foam roller applications may contribute to the determination of more effective training protocols for the long-term success of athletes (Chetham et al., 2015; Lim & Park, 2019; Unlu et al., 2023) . When we review the researches in the literature, we observe that foam roller applications are recommended for their ability to increase muscle function, optimise muscular efficiency, strengthen muscle strength, increase range of motion and improve flexibility. When this technique is used, it is thought that the friction caused by the rotational movement of the roller and the resulting increase in intramuscular heat contribute to improve the fluidity in the applied area. The results of the study show significance in all parameters evaluated. Therefore, we can say that acute foam roller exercises positively affect the performance of archers.

Recommendations

Conducting various applications in different sports branches can make a significant contribution to the scientific literature. At this point, studies on athletes of different age groups and genders can further enrich the knowledge base by enabling the data to be obtained to be spread over a wide perspective. In particular, studies focusing on the performances of female athletes in different disciplines can contribute to the understanding of gender-based differences in the field of sport.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPHELS journal belongs to the authors.

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