LOOK ACADEMIC PUBLISHERS
OPEN ACCESS

INTERNATIONAL JOURNAL OF ENVIRONMENTAL & SCIENCE EDUCATION
2016, VOL. 11, NO. 10, 3251-3257

Effect of Reaction Developing Training On Audio-Visual Feet Reaction Time in Wrestlers

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ABSTRACT

Reaction time is one of the most determinative elements for a successful sports performance. The purpose of this study was to investigate the effect of 12-week feet reaction developing trainings upon feet reaction time of females at 11-13 age interval. Volunteer sportsmen between 11 and 13 age interval who were active in Tokat Provincial Directorate of Youth and Sports participated into the study. The volunteers were totally 22 sportsmen including 11 experimental and 11 controls who have not participated into a programmed physical activity before. To the experimental group, 3-day 30-minute trainings in a week for 12 weeks were administered to develop feet training time as being prepared in accordance with their age. The control group did not participate into any exercise programs during this process. Reaction time measurements were performed to the volunteers twice as before and after the 3-month training through New Test 2000 measurement battery. In comparison of the obtained data, significance test for the difference between two pairs, and level of significance was accepted as $p<0.05$. At the end of the study, whereas no significant difference was found in the control group, a significant difference was obtained in pre-test and post-test averages of the trainings performed to develop feet reaction when carried out regularly for 12 weeks. We considered that the trainings we performed in the study would increase the performance and provide positive contributions upon foot reaction time of the sportsmen at 11-13 age interval.

KEYWORDS
Training, reaction time, wrestling

ARTICLE HISTORY
Received 17 May 2016
Revised 06 July 2016
Accepted 07 July 2016

Introduction

Reaction time is one of the most determinative elements for a successful sports performance. Reaction occurs through a stimulant's reaching to a central nervous system via the neurons, and then a decision is created here and conveyed

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subsequently to the muscles via the neurons; finally, the muscles start to move in accordance with the relevant command (Sevim 2002). In another definition, reaction time is defined as the period when the stimulant started and the reaction started (Guckstein and Walter 1972; Dube et al 2015).

The time of reaction time is an important factor for providing sportsmen to take action slightly faster than their rivals (Çolakoğlu et al. 1993). The sportsman with shorter reaction time is more successful among the ones with the same conditional and technical capacities. The importance of reaction time differs from one branch to another (Polat 2009). In order to develop reactive that that is quite important in terms of sportive performance, studies for improving the reaction time to be performed at an early period should be carried out. The fastest development rate of reaction time is at early ages when speed develops (Agopyan 1993). Reaction time can differ in different sport branches. Moreover, sportsmen are known to have better reaction time rather than the ones who are not sportsmen (Çakıroğlu and Sökmen 2012). Furthermore, reaction time can also be developed through regular trainings in several sport branches (Ergen et al. 1994). By the effect of trainings, the most significant development in reaction time is mentioned to be noticed between 9 and 12 years old (Çolakoğlu et al. 1993; Agopyan 1993; Muratlı 1998; Sevim 2010).

One of these sport branches is wrestling in which time reaction is highly important. Wrestling is defined as the best physical and mental struggling sport in which two people combine their strength and muscular force with wrestling technique in order to fend themselves off, or to have the advantage over the other mutually (Kaynar 2014). Wrestling is a sport requiring properties such as high level endurance (aerobic, anaerobic, respiratory functions), power, flexibility, speed, agility, balance, strategy, sportive performance and control (Kabakçı 2009; Yoon 2002). Success in wrestling is determined according to physical properties, technique and motivation of the sportsmen, their position during the match, and their ability on acting in the most accurate way and making the best decision (Günaydın et al. 2002). Wrestling forces all organism and its functional systems, and provides organism to develop in harmony during the period of development (Başer 1998). As in several branches, the sport of wrestling has also effects upon the reaction time (Kürkçü et al. 2007). Moreover, it is highly important for reaction time to be at an optimal level (Kermen 2002; Sevim 2010). Because the sportsmen should be highly fast in defense or counter attack performed against the attack of the rival. For example, in a wrestling match, when the sportsman sees the movement of a plunge to the foot, s/he should have the reaction of taking the foot away or proceed to counter attack (defense). In this sense, reaction time is a determinative factor for the performance, and is closely correlated with wrestlers' having the ability of making immediate decisions especially they are under the pressure of their rivals. Although positive effect of physical trainings upon the reaction time has been known, it could be noticed in the literature that there were limited number of studies investigating the relationship of foot reaction time and training in sportsmen who have just started to especially wrestling.

The purpose of this study was to investigate the effect of foot reaction time developing wrestling trainings related to female children at 11-13 age interval upon the foot reaction time.

Method

Totally 22 female students at 11-13 age interval who have just started their wrestling trainings within the body of Provincial Directorate of Youth Services were included into the study. The cases were collected according to a voluntary basis, and all cases were informed about the study. The cases were categorized as experimental and control groups by the random method; whereas training relayed to developing feet reaction time was administered for three days during the 12-week period to the wrestlers in the experimental group, no program was administered to the sportsmen in the control group for that purpose.

The training program performed to the experimental group was prepared by asking the opinions of wrestling trainers at national team level. The trainings were worked out as volunteers' taking their feet back according to audible or lightened commands while waiting in a way to take the position of competition. A mechanism issuing a red and green light command for the visual (light) reaction training was prepared. In this mechanism, the sportsmen were asked to take the right foot back when the red light was on, to take the left foot back when the green light was on, and to take both feet back by jumping when both red and green lights were on. The trainer used the mechanism manually. In audible reaction, the commands were issued through the whistle or clapping. The command issued with the whistle was accepted as taking the right foot back, the command issued with clapping was accepted as taking the left foot back, and when the commands wits whistle and clapping were at the same time, it was accepted as taking the both feet back. These trainings related to the reaction were administered for totally 30 minutes including 10 minutes for audio, 10 minutes for resting and 10 minutes for visual.

After recording the height and bodyweight of the sportsmen, reaction measurements were carried out. Foot reaction time test (right foot audio, left foot audio, right foot light, left foot light, selected foot light) was performed to all cases participated into the study. The measurements were repeated twice at the beginning and end of the 12-week training program. Before the measurements, the volunteers performed warm-up and stretching exercises for 15 minutes.

Reaction time measurement was made 'New Test Power Brand device' (Büyükipekci and Taşkın 2011; Çatıkkaş et al. 2011; Çakıroğlu and Sökmen 2012). Before starting to the measurement, the volunteers took a chair in a position they would sit comfortably. The environment where the measurement was performed was provided to be silent and sufficiently lighted, and the room temperature was 23-24 degrees in order for the volunteer to focus their attention. A button battery that stops the time was placed under the foot big toe of the volunteers sat comfortably down the chairs. Before starting to the test, a test for trail purposes was performed to the volunteers for 5 times. Then, foot reaction time of the volunteers was measured according to light and sound.

Statistical Methods

The data were expressed as mean ± standard deviation or frequency. Independent samples t-test and paired samples t-test were used to compare the continuous normal data between independent or dependent groups. A p-value <0.05 was considered as significant. The analyses were performed using SPSS 19 (IBM SPSS Statistics 19, SPSS inc., an IBM Co., Somers, NY).

Results

The values related to the physical properties of the study and control groups were presented in Table 1.

Table 1. Physical properties of the wrestlers in study and control groups

	Study Group (n=11) Mean ± SD	Control Group (n=11) Mean ± SD	t	p*
Age(year)	11,82 ± 0,75	12,09 ± 0,94	0,750	0,462
Height (cm)	1,51 ± 0,06	1,52 ± 0,07	0,618	0,543
Weight (kg)	44,09 ± 5,50	42,91 ± 5,66	0,458	0,652
BMI	19,35 ± 1,93	18,44 ± 1,99	1,087	0,290

*Independent Samples T test.

It was found that there was no significant difference among the age, height, weight and body mass index (BMI) averages of the groups participated into the research.

Foot reaction time values related to the study group were presented in Table 2.

Table 2. Foot reaction time pre-test and post-test measurements of the study group

	Pre-Test Mean ± SD	Post-Test Mean ± SD	t	p*
Right Foot Audio React (ms)	403,79 ± 59,60	334,89 ± 25,12	4,979	0,001
Left Foot Audio React (ms)	378,85 ± 67,70	344,46 ± 58,30	6,359	0,000
Right Foot Light React (ms)	444,90 ± 67,93	390,87 ± 53,44	3,735	0,004
Left Foot Light React (ms)	434,62 ± 66,99	371,71± 67,50	6,636	0,000
Mixed Light React (ms)	472,00, ± 69,68	391,89 ± 62,80	6,854	0,000

*Paired Samples t-test

In pre-test and post-test comparisons of the 12-week trainings performed to the volunteers, it was found that there was a significant difference between right and left foot audio, right and left foot light and mixed audio reaction times ($p<0.01$).

Foot reaction time values related to the control group were presented in Table 3.

Table 3. Foot reaction time pre-test and post-test measurements of the control group

	Pre-Test Mean ± SD	Post-Test Mean ± SD	t	p*
Right Foot Audio React (ms)	393,36 ± 25,65	375,63 ± 89,36	1,402	0,191
Left Foot Audio React (ms)	362,72 ± 104,28	648,36 ± 972,27	0,979	0,858
Right Foot Light React (ms)	406,45 ± 109,97	407,45 ± 105,35	0,184	0,350
Left Foot Light React (ms)	416,00 ± 86,37	409,90 ± 88,24	2,177	0,055
Mixed Light React (ms)	481,57 ± 134,48	455,54 ± 133,06	1,072	0,309

*Paired Samples t-test

When the pre-test and post-test evaluations of the control group were compared, no significant difference was found between right and left foot audio, right and left foot light and mixed audio reaction times ($p>0.05$).

Discussion and Conclusion

Although the studies discussing the reaction time in different branches were encountered in the literature, it was noticed that to obtain concrete data related to foot reactive time at 11-13 age interval especially in wrestling was noticed to be difficult due to having no studies on this. Therefore, the literature was tried to be developed through this study carried out on the subject for the first time. In this sense, our research was totally original, and we considered that this would provide significant contributions for the following researches to be carried out. Moreover, because there were no studies related to foot reaction time in wrestling, the comparisons were made with the researches carried out at a similar quality in different branches.

In the study, it was determined that there was a positive development in terms of right foot sound, left foot sound, right foot light, left foot light and right or left (mixed) feet light reaction times in sportsmen of the experimental group as result of the foot reaction time developing trainings performed for a 12-week period. No positive development was determined in test results related to the reaction time in control group sportsmen to who no training was performed.

Because reaction time is one of the indicators of neuron-muscle performance, it is the most important factor considered as the criteria in sportive performance (Çimen 1994). In order for the sportsmen to have a better performance, reaction time is required to be better as well as other sportive properties (Kabakçı 2009; Göral et al. 2012). Reaction time as a determinative factor in most sports can be developed through regular trainings (Çolakoğlu et al. 1993). By the effect of the trainings, the most significant development in reaction time was mentioned to be at 9-12 years old (Agopyan 1993). For learning and developing motor skills, the period between 7 and 12 age interval was the most productive and appropriate time (Çelik et al. 2013). It was mentioned that reaction time could be developed through the regular trainings, and especially simple reactions were possible to be shortened at the rate of 10-15% as result of the regular trainings (Bompa 2003; Davranche et al. 2006). In their study, Biçer and Savucu (2008) determined significant difference in reaction time of the experimental group as result of step. Polat (2009) performed 12-week basic badminton trainings to the children at 9-12 age interval, and significant difference at reaction time was noticed at the end of the study. In the research carried out by Yıldırım et al. (2011), it was determined that 12-week tennis trainings created a significant difference at audio and visual reaction time values of female children at 8-10 age interval. Researchers observed that tennis trainings performed for 3 months shortened the reaction time (both audio and visual) in female and male children at the age of 8, 9 and 10. In their study, Kürkçü et al. (2007) mentioned that exercise affected the reaction time positively in adolescent wrestlers. In his research, Arslan (2014) determined that the exercise program performed for a 12-week period created a significant difference in audio and visual reaction time of children at 8-10 age interval. Fong et al (2013) also specified that taekwondo trainings performed regularly positively affected and developed reaction time of the sportsmen. In their study, Fong et al. proved that reaction time of the group that played badminton for at least a 2-year period was better than the group who did not play. Furthermore, badminton was

specified to have a positive effect upon reaction time of the sportsmen. In his study, Koç (2013) mention that anaerobic trainings performed to national free-style and Greco-Roman wrestlers created significant decrease at reaction time against the sound. In their study, Çakıroğlu and Sökmen (2012) mentioned that 12-week judo technical trainings games created a positive effect upon the reaction time in children at 8-10 age interval.

It was mentioned that reaction time was possible to developed up to 0.12 second as result of regular trainings; this development has not arisen from the speed for the stimulant to arrive brain and come from the brain to the organs, but arisen from the protection of reaction speed and turning the action into a more economic situation through a technical skill level (Sevim 2002).

As result of the study, foot reaction developing trainings performed for a 12-week period were observed to have positive effects upon the foot reaction time in female children at 11-13 age interval. The data we obtained in our study were compatible with the results in the literature.

Consequently, we considered that the trainings we performed in the study would increase the performance and provide positive contributions upon foot reaction time of the sportsmen at 11-13 age interval.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Mustafa Kaya holds a PhD in physical education and now is an associate professor at Gaziosmanpaşa University, Tokat, Turkey.

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