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SEDANTER VE MASA TENİSİ OYUNCULARININ GÖZ HAREKETLERİNİN İNCELENMESİ

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A Çalışma Deseni (Study Design)
B Verilerin Toplanması (Data Collection)
C Veri Analizi (Statistical Analysis)
D Makalenin Hazırlanması (Manuscript Preparation)
E Maddi İmkanların Sağlanması (Funds Collection)

Özet: Çalışmamızın amacı, elit düzeyde masa tenisi oyuncuları ile sedanter kişiler arasındaki bazı görme parametrelerinin incelenmesidir. Bu çalışmaya elit düzeyde masa tenisi oynayan 20 sporcu ile 20 sedanter kişi olmak üzere 40 kişi gönüllü olarak katılmıştır. Araştırmamıza katılan sporcuların hepsi göz muayenesinden geçirilmiş ve görme parametreleri ön test ve son test yapılarak incelenmiştir. Veri dağılım niteliğini belirlemek için Shapiro-Wilk testi uygulanmıştır. Verilerin normal dağılım gösterdiği doğrulanmış olup, istatistiksel farklılıkları incelemek için bağımsız t-test yapılmıştır. Sakkadik göz hareketleri (SGH); yakın sakkadik ve uzak sakkadik testinde, profesyonel masa tenisi oyuncuları ve sedanterlerde görüş keskinliği ve akomodasyon (görmeye kolay uyum sağlama) özelliklerinde anlamlılık düzeyi ($p<0.05$) olarak kabul edilmiştir. Sonuçlar incelendiğinde, yakın ve uzak sakkadik testinde masa tenisi oyuncuları ile sedanter grup arasındaki istatistiki açıdan anlamlı farkın olduğu tespit edilmiştir (P:0,02*-T:2,35, P:0,04*-T:2,12). Elde edilen bu iki parametre masa tenisçilerin başarıya ulaşma nedenlerinden biri olabilir.

Anahtar kelimeler: Sakkadik göz hareketi, Görüş keskinliği, Yakın sakkadik, Uzak sakkadik

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INVESTIGATION OF EYE MOVEMENT OF SEDENTARY AND TABLE TENNIS PLAYERS

Abstract: This study aimed to examine the elite level table tennis players with some visual parameters between sedentary individuals. In this study, 20 elite-level athletes playing table tennis 20 sedentary people, including 40 people participated voluntarily. All the athletes were passed through eye examinations. Besides, vision parameters were examined with pre-test and post-test. In the evaluation of the data, we used the Shapiro Wilk test to see normality assumptions. Because the data were verified to have a normal distribution, we used independent samples t-tests to examine the statistical differences. Saccadic eye movement (SGH); near the saccadic and remote saccadic test, a professional table tennis player and sedentary subjects in visual acuity and accommodation (adaptation easy to see) the level of significance in the properties ($p < 0.05$) was adopted. When the results were analyzed, we identified that the saccadic test in table tennis players near and far with that in terms of statistically significant difference between the sedentary group (P:0,02*-T:2,35, P:0,04*-T:2,12).

Keywords: Saccadic eye movement, Visual acuity, Near saccadic, Far saccadic

1. INTRODUCTION

There are some essential factors to have tendencies for sport. These are strength, height, flexibility, thinking capability, and seeing capability. High speed is one of the main characteristics in table tennis and ball moves in different ways, that is why players need to move more quickly. Seeing the system plays a vital role in the coordination of movements (Williams et al., 2002). Many pieces of research showed that there is a strong relation between saccadic movements and hand-eye coordination (Rodrigues et al., 2002). Saccadic movements are ones which represent quick fixation. They are free movements of eyes between two points. So the imagination of any object is always guaranteed to be on the fovea. The speed of object and speed of movement are in harmonization. Generally, speed reaches at 200˚-400˚ in seconds, even it may be at 700˚ in seconds. So imagination is provided to occur on fovea in the quickest way (Eker, 2005). İn table tennis; visual and motoric abilities play essential roles for guessing about the competitor's hit, volume, error, speed and hitting point of the next ball and determining hitting style (Turhan et al., 2007). Since eyesight and visual follow is highly substantial in many sports fields, the question whether these sportsmen's eye movements differ from others is seen on the agenda. Following objects which move swiftly cause saccadic movements in the eyes. It is considered that parameters regarding saccadic eye movements of athletes involved in these branches are different from athletes involved in different branches and sedentary ones (Aksoyak et al., 2005). In many types of research, researchers identified significant differences in visual parameters of ones doing sport and not doing sport within sports such as volleyball, badminton, tennis, squash. When compared ones performing the sport with ones not performing sport, the flow of movements in persons doing sport becomes quicker (Jafarzadephu et al., 2007; Jafarzadephu et al., 2004; Rodrigues et al., 2002; William et al., 1998). Hisao and Masaru (1993) observed that visual acuity was better in ones performing sport rather than ones not performing a sport. In experts' opinions,

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this characteristic develops in athletes since they continuously follow balls moving quickly with their eyes in their pieces of training. This situation is more transparent, especially when a competitor tries to return in services with speed over 200 km in one hour under tennis sport (William et al., 1998). According to Hitzemen and Bekermen (1993), an athlete's performance can be increased with training to improve visual parameters. Table tennis players benefit from saccadic eye movements. From the starting point to the finishing point of saccadic movements, it is crucial to fix eyes. A table tennis player is required to concentrate on a small ball moving freely in air well (Jafarzadephu et al., 2004). In this context, in the present study, we aimed to examine some visual parameters in the first league among professional table tennis players and non-athletes.

2. MATERIALS AND METHODS

Study Group: In our study, 40 persons, including 20 athletes and 20 sedentary (control group) who played in the first league of Irish table tennis, participated as volunteers. Age averages of the experimental group were 24±7.96 and of the control group was 23±3.28. All of the athletes included in our research were subjected to the routine eye and eye examination using Topcon chart projector in the lab for visual acuity and Biopak registration system for saccadic eye movements (SEM), they were registered and analyzed. Optical parameters were studied with pre-test and post-test. In order to measure optometrist near and far saccadic eye movement, the subjects were required to sit on a comfortable chair and concentrate on two red cards away from 6 meters with intervals of 30 cm, for measuring SEM, loops of both eyes on horizontal SEM temporal red cards were recorded for one minute. Near saccadic was registered away from one meter with the same method.

Statistical analysis: Data was tested for normality with the Shapiro-Wilk test. Independent Samples T-Test was used to compare pairwise group variables that showed a normal distribution. Significance was accepted for values of $p<0.05$ with a 95 % confidence interval.

3. RESULTS

Table 1. Table of visual acuity, accommodation, far saccadic and near saccadic levels belonging to the sedentary group and table tennis players group

Variables		Sum of Squares	SD	Mean Square	F	Jetvel F	P
Visual Acuity	Between Groups	0.15	2	0.076	1.91	3.25	0.16
	In Groups	1.476	37	0.04			
Accomodation	Between Groups	68.85	2	34.425	2.65	3.25	0.08

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	In Groups	480.25	37	12.98			
Far Saccadic	Between Groups	1393.2	2	696.6	5.195	**2.35**	**0.02***
	In Groups	6961.2	37	134.09			
Near Saccadic	Between Groups	1376.85	2	688.42	3.89	**2.12**	**0.04***
	In Groups	6542.25	37	176.82			

Only significant differences were found in near saccadic and far saccadic movements in table tennis player and sedentary. When the measurements results were analyzed; Saccadic near and far with the control group, the experimental group was significantly different between the movements of value ($p<0,05$). Since the relevant t value was more significant than the t value in the table, arithmetical averages were statistically considered to be significant with 95% confidence.

4. DISCUSSION

In many persons, problems are observed in saccadic movements. Even though this problem is not certain at first sight, it becomes clear owing to saccadic movement test results. Being unable to concentrate, having less visual acuity, being unable to see some words and lines while reading a text, benefiting from fingers while reading a text, having difficulty in kicking a ball and being unable to succeed are regarded as problems. These problems have many reasons; furthermore, one of the important reasons among these is saccadic eye movements. Russo et al. (2003), Sorensen et al., (2001) and Wilkinson (1992) determined that dynamic visual acuity was higher in athletes interested in sports such as table tennis, badminton, baseball, and following quick balls continuously. It is believed that the concentration of eyes on moving objects gives rise to adaptation on the neuromuscular system. The reason for high dynamic visual acuity in these types of athletes is that they always follow quick balls (Hısao and Masaru, 2011; Hitzemen and Bekermen, 1993; Wood and Abernethy, 1997). As a result of the study which analyzed the effects of eyesight training on skills in volleyball, Wilkinson's estimations are as follows; eyesight parameters can be improved with eyesight training. Also, there is a direct proportion between eyesight parameters and success in sport (Wilkinson, 1992). Knudson and Kluka (1997) researched the effects of eyesight and eyesight training on sportive performance and stated that visual capabilities in sport might be easily developed with pieces of training. They informed that visual field is very significant for basketball since events are carried out in each part of the field, basketball players are aware of other events and restraints to themselves in the field though they pay attention to the player having a ball (Knudson and Kluka, 1997). Also, since people's one eye is mostly more dominant than the other one, they mentioned that the dominant eye factor comes first in golf players and baseball players during a hit. Michael et al. (2000) studied cricket athletes' all hits from

eye movements to other movements in the field (Micheal et al., 2000). They also stated that players faced with highly quick ball movements during the play, superior athletes had different skills, latency time was shorter rather than less experienced athletes in their saccadic eye movements had positive contributions on play skills in cricket players. Lenoir et al. (2000) compared saccadic eye movements of a group doing sport regularly and a control group not doing sport in their research and thought that wrong and involuntary eye movements were less in the group doing sport regularly rather than the control group, saccadic rate time was shorter, and saccadic eye movements may be more controlled in athletes involved in branches requiring quick ball movements (Lenoir et al., 2000). Elsawy, (2011) found that there was not a significant difference in saccadic eye movements of the female taekwondo players included in the upper line, and the female taekwondo players included in the lower line. Barber et al. (1976) informed that movement disorders in saccadic movements might occur in individuals who cannot pay attention, even if they are healthy. Levens (1988) suggested that 8% of healthy children could not make a normal saccade of 30 degrees. Khanal (2015) researched that visual skills affected performance in different sports branches in his study and emphasized that visual skills were one of the important factors in sports branches. For example, he stated that hand-eye coordination must be good in sports such as cricket, volleyball as foot-eye coordination must be good in sports such as taekwondo, football. Likewise, he explained that a good athlete must have advanced saccadic eye movements as well as general coordination, these play important roles for success, and visual training positively affects skills and performance. Oudejans et al. (2002) studied about visual control during jump shooting in basketball players at an elite level, analyzed how they shot by jumping when seeing, without seeing and a certain time after seeing when pronounced names of 10 basketball players and stated the recent stage of shooting movement was always controlled and visual information was used by the time the ball was thrown away. Within this research, in terms of near-far saccadic values, significant differences were found between ones doing sport and ones not doing sport. Probably, visual training, that is to say, efforts regarding visual concentration and coordination may lead to improvements in visual parameters. Researchers found significant differences in visual parameters in sports such as volleyball, badminton, tennis, squash between ones doing sport and ones not doing sport. When compared ones doing sport with ones not doing sport, ones who performed a sport, were considered to have quicker eye movements (Jafarzadephu et al., 2007; Jafarzadephu et al., 2004; Rodrigues et al., 2002; William et al., 1998).

5. CONCLUSION

Towards these findings, table tennis players may develop saccadic movements with specialized pieces of training. Also, this parameter may be supported with different measurement methods, suggested to use as criteria of capability choice in this branch.

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