

Examination of the Effects of the Physical Activity, Exercise and Sports on the Anaerobic and Coordination Parameters of the Individuals with Mild Mental Disabilities

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Abstract

Aim: The purpose of the study is to examine the effects of the physical activity, exercise and sports on the anaerobic and coordination parameters of the individuals with mild mental disabilities.

Methods: 31 men with mild mental disabilities participated in the study. The physical activity, exercise and sports program was administered to the participant group for 8 weeks. In the study, pre-test and post-test values of the 8-week program of physical activity, exercise and sports were compared. Qualitative evaluation of the data was conducted using SPSS 20.0 statistical package program. The changes in the anaerobic and coordination parameters were analyzed with the paired sample t test. The significance level was taken as $p < 0.05$ for the comparisons.

Results: It was observed that, at the end of 8-week program of physical activity and exercise, there was a statistically significant difference between the first and last measurements of the students participating in the study in terms of weight, resting pulse, and maximal pulse ($p=0.012$; 0.000 ; 0.001). There was no statistically significant difference in terms of BMI ($p=0.697$). It was observed that, at the end of 8-week program of physical activity and exercise, there was a statistically significant difference in their Hexagonal Obstacle, Pro-Agility, Illinois Agility, and Zig-Zag Tests ($p=0.00$). It was observed that, at the end of 8-week program of physical activity and exercise, there was a statistically significant difference in their Vertical Jump, Standing Long Jump, Margaria-Kalamen, and Step Tests ($p=0.000$).

Conclusion: In conclusion, according to the pre-test and post-test results of the 8-week program of physical activity, exercise and sports in the individuals with mild mental disabilities; while there was no statistically significant difference in their BMI (Body Mass Index), there was statistically significant differences in their weight, resting pulse, maximum pulse, anaerobic, and coordination parameters.

Keywords

Anaerobic,
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INTRODUCTION

Education is the process of consciously creating willful change in the individual's behavior through his/her own life (Ertürk, 1972; Güryıl, 2011). Education is a process that prepares the individual for the social life. Therefore, the education environments should include the rich stimulants that will enable the individual to develop in the mental, social, emotional, and psychomotor areas (Güryıl, 2012). One of these stimulants is sports.

Sports is a social phenomenon that is an important part of the human life affecting the societies (Çakıroğlu & Sökmen, 2012). Sports is extremely important for the children, young adults, elderly, women, and the people with disabilities. People with disabilities have a greater need for the sports in terms of rehabilitation and social adaptation. Sports, in the people with disabilities, is a tool for realizing the desire to enjoy moving, entertain, and succeed (Demirci, 2009)

Sports activities are more beneficial than the other areas for the individuals with disabilities in experiencing the self-esteem, self-confidence, socialization, and the sense of achievement. Since they have respiration and circulatory disorders due to the sedentary lifestyle, physical activities are recommended in order for them to establish good relationships in the society along with their physical and mental development. Physical activity is characterized by the contraction of the skeletal muscles and the body movements resulting in energy expenditure (Topsaç, 2013).

The researches have shown that the individuals with mental disabilities and lacking physical activity are exposed to various diseases (especially heart and respiratory problems, fatty blood vessels,

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bone deformities) due to the inactivity, they usually have loose muscle structure, and they experience loss of motor development with increasing age and increasing mental retardation. These negative situations may limit the physical capacities of the disabled individuals (Özer, 2001).

Considering the health protective aspect of the physical activities, the psychological health and feeling well are as very important as the physical health (Özer, 2001; Onurlu, 2010).

In our society, the physical activity opportunities are limited for all. Therefore, the physical activity areas and facilities for the disabled individuals should be established and a separate effort is needed for this issue. Whenever possible, the senior local and central managers have always stated that the necessary would be carried out to improve the opportunities and to provide the legal rights at the highest level for the individuals with disabilities.

Exercise is a subset of physical activity and can be defined as the body movements that are planned, repetitive, and purposeful attempt to improve one or several components of the physical fitness (Topsaç, 2013; Tekin, 2016).

Exercises are the planned and conscious activities aimed at developing the physical fitness elements (cardiovascular fitness, muscle strength and endurance, flexibility and body posture). In other words, exercise is a set of planned physical activities for the objectives such as the fitness, physical performance, weight control, and good health (Tekin, 2016; Thompson, Gordon & Pescatello, 2009).

Exercise and sports reduce the negativity of the physical structure of the individual, and accordingly, the athlete identity of the individual is strengthened and the self-esteem increases (Top, 2007; Kosma, Cardinal & Rintala, 2002; Graham, Hale & Parker, 2001). Researches show that the exercise and sports have positive effects on the human health. This positive effect includes the individuals with disabilities, who are an important element of the society, and enables them to establish better relationships in society with their physical and mental development (Karakoç, 2015).

Anaerobic performance (AP) is an important term for all sports branches. AP is one of the main factors of success in the sports branches which are performed in a short period of time or in which the explosive force exists and becomes important. Individual and environmental factors are two important determinants in terms of their effect on the performance level of the athletes. As a result of the continuous trainings, the AP level increases. In other words, we can explain this increase as the increase in the ATP-PC stores and the lactic acid system efficiency. Therefore, the energy sources with respect to the athletes and the ability to use them are considered as an important factor in sports performance (Anbarcı, 2018; Özkan, 2007).

On the other hand, the coordination can be explained as the harmonious cooperation with the central nervous system while the skeletal muscle is doing a movement for a specific purpose (Sevim, 2006; Merdan, 2016). There are two types of coordination, that is, general and specific.

General Coordination is the ability to perform the different motor skills in a reasonable and appropriate way without considering a specific sports branch. With the multifaceted development, each athlete should gain the sufficient general coordination. Multi-faceted development should be taken into consideration once one begins sports. General coordination exercises should be reduced gradually with the start of special exercises.

Specific coordination is the ability to quickly, smoothly, and consistently perform the different motor skills in the specific sports branches. In this respect, the specific coordination is closely related to the characteristics of the motor skills and provides the athlete with the additional skills for an effective level of efficiency in the competition and training. Specific coordination also includes the development of coordination integrated with the motor skills according to the characteristics of the sports branches. It can be stated that when an athlete can perform a skill in fast rhythm and tempo, such as slalom skiing, free style swimming, and hurdle race, she/he should have the speed coordination (Merdan, 2016; Zeytinoglu, 2009).

METHOD

Participants

With the framework of internship practices of the students studying at the Department of Exercise and Sports Education for the Disabled, Faculty of Sports Sciences, İnönü University; 31 male students, at

the age of 14-17, studying at three different Special Education Institutions in Malatya, participated in the study. Before starting the program, families of the students were informed about the program and their consent was obtained. 31 male students participating in the study were divided into three groups composed of 10, 10, and 11. 60-minute physical activity and sports program was administered to each group 2 days a week for 8 weeks. Within the scope of the physical activity and sports program, the students were given the educational games, collective exercises, coordination, sound and musical games, and quick power exercises in a way from simple to complex.

Hexagonal obstacle, pro-agility, illinois agility, and zig-zag tests were applied to the students in order to observe the changes in their coordination parameters. On the other hand, the vertical jump, standing long jump, margaria-kalamen, and step tests were applied in order to observe the changes in their anaerobic parameters. In addition, the changes in the weight, BMI, resting pulse, and maximal pulses of the students were observed. The measurements for data collection were made as follows

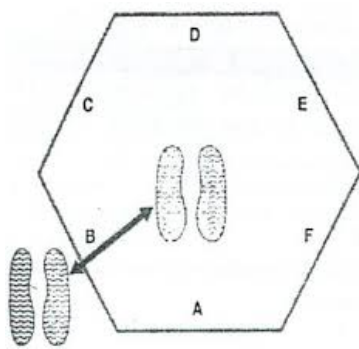


Figure 1. Hexagonal Obstacle

Pro-Agility Test: The pro-agility test (also known as the 20-yard shuttle test) area (Figure 2) is determined by placing markers 5 yards (4.57m) left and right to the start line. The photocell gate is placed on the starting line. Repeated passing times can thus be recorded. The participant takes her/his place on the start line before the test starts. When ready, she/he first touches the marker on the right and then touches the marker on the left, then finishes the test by passing through the start line (Karacabey, 2013; Bayraktar, 2013).

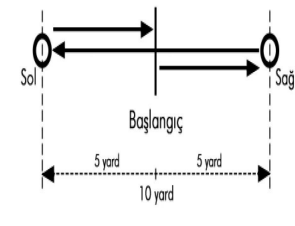


Figure 2. Pro Agility Test

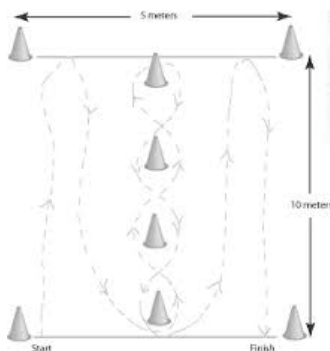


Figure 3. Illinois Agility Test

Zig-Zag Test: Zig-zag test is used to determine the speed and agility parameters of the subject. In the test, 4 cones are placed on the corners and 1 cone is placed in the center of the diagram. The long edge of the diagram is 16 feet (1feet: 0.3m) and the short edge is 10 feet. The subjects follow a route defined on the diagram. The subject performs the test with the maximal power. The test is repeated twice and the higher score is recorded (Mackenzie, 2005; Arı & Çolakoğlu, 2017).

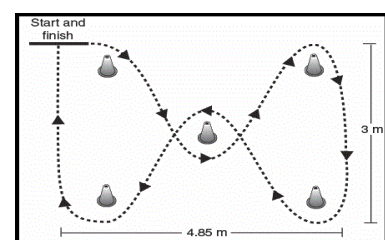


Figure 4. Zig-Zag Test

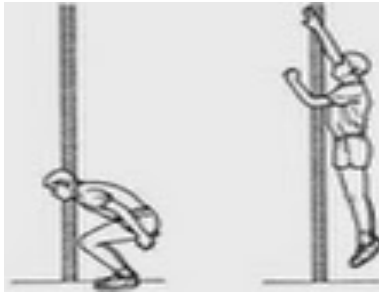


Figure 5. Vertical Jump Test

Vertical Jump Test: The subjects face the wall. For the subjects to perform the test more willingly, the colored tapes are adhered to their index, middle and ring fingers. With the maximum power, the subject bends down and jumps upwards with the arms akimbo, legs open at the shoulder width, and upright position (Güler, 2016; Özkan, Köklü & Ersöz, 2010). The colored bands on the fingers are adhered to the meter available on the wall. The highest tape adhered is recorded and the test is repeated twice.

Standing Long Jump: The two-leg forward jump test was measured with a specially prepared carpet meter. The subject stands at the zero point on the carpet with the legs open at the shoulder width and the toe tips behind the zero line. The subject is told to make a leap with the legs open at the shoulder width and without falling backwards. The subject bends the knees and swings both arms backwards. In this position, she/he pushes the legs and leaps as far as possible by swinging the arms forward. The measurement results are recorded in cm. The test was repeated twice and the best score was recorded (Güler, 2016).

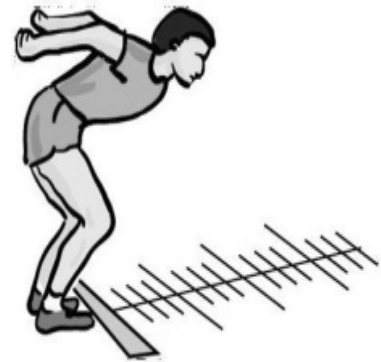


Figure 6. Standing Long Jump

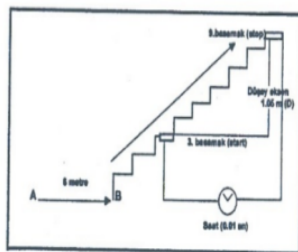


Figure 7. Margaria-Kalman Test

Margaria – Kalaman Test: In this test, the subjects will sprint 6 m, then run up the 9 stairs taking 3 steps at a time, and finish the test in 3 steps. While the subjects are performing the test, with the help of the photocells on the 3rd and 9th stairs, the time of the vertical work will be measured. The anaerobic power of the volunteer will be calculated by applying the value obtained from the test to the formula (Hindistan, 2015).

Step Test: Height of the stair is 40 cm for men and 33 cm for women. The subjects step on and off the stair for 1 minute. The number they reach at the end of 1 minute is recorded. The working capacity of the person is calculated with the formula. With a full rest, the test is repeated twice. The best score is recorded (Güllü, 2010).

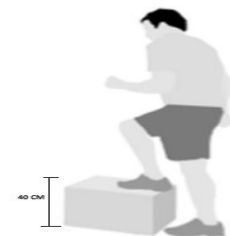


Figure 8. (40 cm) Step Test

WC (Working Capacity) = $h \times n \times W \times k$

h=Height of stair (m) **W**=weight (kg)

n=the number stairs stepped on and off in 1 minute; **k**=1,3 factor

*Max. The pulse measurements were taken immediately after the end of the test with the Polar RS 400 device.

Statistical analysis

SPSS 20.0 package program was used to analyze the data obtained in the study. After the normality analysis, the t-test was used to compare the data obtained.

RESULTS

The findings we reached as a result of the study are given in the tables below.

Table 1. Physical Characteristics of the Participants

	N	X	SS
Age	31	15.516	1.150
Height	31	171.483	10.957

As indicated in the table above, the average age of the 31 males with mild mental disabilities is 15.516 and the standard deviation is 1.150. It was found that their average height was 171.483 and the standard deviation was 10.957.

Table 2. Measurement Results of the Participants in terms of Weight, BMI, Resting Pulse, and Maximal Pulse

Anatomic Measurements		N	X	SS	T	P
Weight	First Measurement	31	64.5161	10.76374	2.689	.012
	Last Measurement	31	63.9065	10.17752		
BMI	First Measurement	31	21.8290	2.31606	-.392	.697
	Last Measurement	31	21.9581	2.56213		
Resting Pulse	First Measurement	31	86.4194	2.33487	6,588	.000
	Last Measurement	31	84.1290	2.72937		
Maximal Pulse	First Measurement	31	169.483	6.88414	3.549	.001
	Last Measurement	31	166.290	5.11334		

p<0.05

Considering the table above it was observed that, at the end of 8-week program of physical activity and exercise, there was a statistically significant difference between the first and last measurements of the students participating in the study in terms of weight, resting pulse, and maximal pulse (p=0.012; 0.000; 0.001). There was no statistically significant difference in terms of BMI (p=0.697).

Table 3. Coordination Test Results of the Participants

Coordination Tests		N	X	SS	T	P
Hexagonal Obstacle Test	Pre-test	31	55.9910	9.88620	4.634	0.000*
	Post-test	31	49.5184	7.20007		
Pro-Agility Test	Pre-test	31	7.7074	.81723	4.883	0.000*
	Post-test	31	7.2952	.87716		
Illinois Agility Test	Pre-test	31	24.7513	2.64362	6.359	0.000*
	Post-test	31	23.3103	2.90548		
Zig-Zag Test	Pre-test	31	10.4068	1.13487	7.580	0.000*
	Post-test	31	9.6823	1.11559		

*p<0.05

Considering the table above it was observed that, at the end of 8-week program of physical activity and exercise, there was a statistically significant difference in their Hexagonal Obstacle, Pro-Agility, Illinois Agility, and Zig-Zag Tests (p=0.00).

Table 4. Anaerobic Test Results of the Participants

Anaerobic Tests		N	X	SS	t	P
Vertical Jump (cm)	Pre-test	31	242.871	16.69479	-16.064	0.000*
	Post-test	31	249.935	15.51544		
Standing Long Jump (cm)	Pre-test	31	120.483	34.70530	-5.341	0.000*
	Post-test	31	127.967	34.14233		
Margaria – Kalamen Test	Pre-test	31	5.6477	0.71701	8.330	0.000*
	Post-test	31	5.3077	0.75416		
Step Test	Pre-test	31	39.8387	8.19795	-12.648	0.000*
	Post-test	31	44.2581	7.11790		

*p<0.05

Considering the table above it was observed that, at the end of 8-week program of physical activity and exercise, there was a statistically significant difference in their Vertical Jump, Standing Long Jump, Margaria-Kalamen, and Step Tests (p=0.000).

DISCUSSION

When the related literature was reviewed;

In his study examining the effect of the 8-week fitness exercises on the cardiovascular risk factors in women, Akkurt (2018) divided 30 women into two groups, that is, the exercise group comprised of 15

and the control group comprised of 15, and administered the fitness exercises to the exercise group three days a week for eight weeks. As a result of the study, a statistically significant difference was observed in the body weights of the exercise group.

In their study aiming to determine the effect of aerobic exercise on some physiological parameters in young women and middle-aged women, Çolakoğlu & Karacan (2006) reported that there were significant decreases in the body weights of the participants of the study as a result of the aerobic exercises.

In their study to determine the effect of movement training on the physical fitness parameters in children, Saygın et al. (2005) found that regular exercise had a positive effect on the body weight of the children.

In his study comparing the anthropometric and motor characteristics of male basketball and football players at the age of 10-16, Güler (2016) emphasized that there were statistically significant differences in the standing long jump, vertical jump, and hexagonal obstacle parameters of the basketball and football players at the age of 10-16.

In his study determining the anaerobic power of the judoists with high performance through some tests and evaluating the results, Kabadayı (2000) administered the tests of Margaria-Kalamen anaerobic power, vertical jump anaerobic power, standing long jump, 1 repetition maximum bench press, 1 repetition maximum squat, 50-yard (1yrd = 0.91m) sprint, 40-yard sprint, 50-yard sprint with 15-yard acceleration, and 40-yard sprint with 15-yard acceleration and a correlation analysis between them was conducted. No correlation was found between the Margaria-Kalamen test, 40-yard sprint test, and 40-yard sprint with 15-yard acceleration test, whereas there was a correlation between all the other tests.

In his study aiming to examine the badminton players in the National team and local leagues in terms of the anthropometric features, agility, flexibility, and endurance; Yılmaz (2013) found that there were statistically significant differences in the vertical jump, standing long jump, and zig-zag run results of the national athletes, compared to the amateur athletes. He stated that the physical fitness in the sports branches requiring long-term and intensive exercise has an effect on the flexibility, balance, endurance, jump, speed and agility, reaction, and the anthropometric features.

In his study examining the effect of swimming training on the free style degrees and some anthropometric and motoric features of the 8-10-year-old performance group swimmers, he stated that there was a 7.61% development in the zig-zag test at the end of the 14-week exercise and sports program.

In his study examining the effect of plyometric training on the balance and soccer-specific skills of the children at the age of 11-12, Akçınar (2014) found a statistically significant difference in the Illinois Agility Test at the end of the 8 weeks compared to the first week.

As can be seen from the studies compared above, there are studies supporting our study.

CONCLUSION

As a result of the study aiming to examine the effects of the physical activity, exercise, and sports on the anaerobic and coordination parameters of the individuals with mild mental disability; at the end of the 8-week program of physical activity, exercise, and sports for the individuals with mild mental disabilities, whereas there was no statistically significant difference in their BMIs, there were statistically significant differences in their parameters of weight, resting pulse, maximum pulse, hexagonal obstacle, margaria-kalamen, zig-zag, illionis agility, pro-agility, steps, vertical jump, and standing long jump. The reason why there was no significant difference in the BMI was considered to be the fact that there was no change in the heights of the students participating in the study.

In conclusion, we can state that the increased number of individuals in the exercise group and the application of increased physical activity and exercise programs can make more positive contributions to the anaerobic capacity and coordination skills of the individuals with mild mental disability.

REFERENCES

- Akçınar, F. (2014). 11-12 Yaş Çocuklarda Pliometrik Antrenmanın Denge ve Futbola Özgü Beceriler Üzerine Etkileri, Sağlık Bilimleri Enstitüsü, Doktora Tezi, İnönü Üniversitesi, Malatya

- Akkurt, M. (2018). Sekiz Haftalık Fitness Egzersizlerinin Bayanlarda Kardiovasküler Risk Faktörlerine Etkisinin İncelenmesi, Sağlık Bilimleri Enstitüsü, Yüksek Lisans tezi, Erciyes Üniversitesi, Kayseri
- Anbarcı, S.(2018). 8 Haftalık Trx Ekipmanı ile Yapılan Statik ve Dinamik Egzersizlerin Denge ve Anaerobik Performans Üzerine Etkileri, Sağlık Bilimleri Enstitüsü, Yüksek Lisans Tezi, Gaziantep Üniversitesi, 2018.
- Arı, Y. & Çolakoğlu, F. F. (2017). The Effect of 12-Week Plyometric Training Program on Anaerobic Power, Speed, Flexibility and Agility for Adolescent Football Players, *European Journal of Physical Education and Sport Science*, Volume:3, Issue:5, ISSN:2501-1235.
- Atasoy, H. (2018). Yüzme Antrenmanlarının 8-10 Yaş Performans Grubu Yüzücülerinin Serbest Stil Dereceleri ile Bazı Antropometrik ve Motorik Özellikler Üzerindeki Etkisinin İncelenmesi, Sağlık Bilimleri Enstitüsü, Yüksek Lisans Tezi, İstanbul Gelişim Üniversitesi, İstanbul.
- Bayraktar, I. (2013). Elit Boksörlerin Çeviklik, Sürat, Reaksiyon ve Dikey Sıçrama Yetileri Arasındaki İlişkiler. *Akademik Bakış Dergisi*. ISSN:1694-528X (35)1-8.
- Çakıroğlu & Sökmen (2012). 12 Haftalık Judo Teknik Antrenman ve Oyunlarının 8–10 Yaş Grubu Erkek Çocuklarda Reaksiyon Zamanı Üzerine Etkisi, *Selçuk Üniversitesi Beden Eğitimi ve Spor Bilim Dergisi*, 2012; 14 (1): 71-74
- Çolakoğlu F. F. & Karacan S. (2006). Genç Bayanlar ile Orta Yas Bayanlarda Aerobik Egzersizin Bazı Fizyolojik Parametrelere Etkisi, *Kastamonu Üniversitesi Eğitim Dergisi*, 14(1): 277-284.
- Demirci, H. (2009). Esneklik Çalışmalarının Eğitilebilir Zihinsel Engelli Çocukların Hareketlilik Gelişimleri Üzerine Olan Etkisi, Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, Sakarya Üniversitesi, Sakarya.
- Ertürk, S. (1972). Eğitimde “Program” Geliştirme, Ankara: H.Ü Yayını
- Fernhall, B. (1993). Physical Fitness and Exercise Training of Individuals With Mental Retardation. *Med. Sci Sports and Exercise*, 25(4):442–450.
- Graham, G., Hale, S. & Parker, M. (2001). Children Moving a Reflective Approach to Teaching Physical Education. Mayfield Publishing Company, Mountain View, California, 5.
- Güler, U. (2016). 10 – 16 Yaş Grubu Erkek Basketbol ve Futbolcuların Seçili Antropometrik ve Motorik Özelliklerinin Karşılaştırılması, Sağlık bilimleri Enstitüsü, Yüksek Lisans Tezi, İstanbul Gelişim Üniversitesi, İstanbul.
- Güllü, A. (2010). <http://web.hitit.edu.tr/dosyalar/materiyaller/abdullahgullu@hititedutr170220169K6W8F9I.pdf>, Erişim: 01.03.2018
- Güryıl, E. (2011). 6 Yaş Grubu Çocuklarda Ritmik Hareketlerin Koordinasyon Gelişimine Etkisinin İncelenmesi. İstanbul. Marmara Üniversitesi Eğitim Bilimleri Enstitüsü Beden Eğitimi ve Spor Öğretmenliği Ana Bilim Dalı Spor Eğitimi Bilim Dalı Yüksek Lisans Tezi.
- Hazır, T., Mahir, Ö. F. & Açıkada, C. (2010). Genç Futbolcularda Çeviklik ile Vücut Kompozisyonu ve Anaerobik Güç Arasındaki İlişki. *Hacettepe J. of Sport Sciences*. 21 (4), 146–153.
- Hindistan, İ.E. (2015). Eğitim Antrenmanlarının Sprint Performansının Süratte Devamlılık Evresi Üzerine Etkilerinin İncelenmesi, Sağlık Bilimleri Enstitüsü, Doktora Tezi, Akdeniz Üniversitesi, Antalya.
- Kosma, M., Cardinal, B, J. & Rintala, P. (2002). Motivating Individuals With Disabilities to be Physically Active. *Quest (Human Kinetics)*, 54, 116-17.
- Karakoç, B. (2015). 12 Haftalık Rekreatif Fiziksel Etkinlik Programının Eğitilebilir Zihinsel Engellilerin ve Ailelerinin Üzerine Etkileri, Sağlık Bilimleri Enstitüsü, Doktora Tezi, Dumlupınar Üniversitesi, Kütahya.
- Kabadayı, M. (2000). Üst Düzey Judocuların Anaerobik Güçlerinin Bazı Test Yöntemleri ile belirlenmesi ve Sonuçlarının Değerlendirilmesi, Sağlık Bilimleri Enstitüsü, Yüksek Lisans Tezi, Ondokuz Mayıs Üniversitesi, Samsun
- Karacabey, K. (2013). Sport Performance and Agility Tests (Sporda Performans ve Çeviklik Testleri), *International Journal of Human Sciences*, Volume:10, Issue:1, Year:2013, ISSN:1303-5134

