THE EFFECT OF REGULAR SWIMMING EDUCATION ON CHILDREN'S SOME ANTHROPOMETRIC PARAMETERS AND HANDGRIP STRENGTH

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ABSTRACT

This study aims to examine the effect of 12-week regular basic swimming trainings on anthropometric measurements and handgrip strength of children aged 8-10. 96 male children attended the research. 48 of the children formed the control group and 48 of them formed the experimental group. Pretest measurements of 48 children in the experimental group were made before basic swimming trainings that would last for 12 weeks and posttest measurements were made after trainings. The same measurements were taken from the other 48 children in the control group, yet any training was not applied to them. Basic swimming education was given in line with complete recovery principle to the experimental group for 12 weeks-three days a week and 60 minutes a day.

The statistical analyses were performed using the Statistical Package for the Social Sciences version 15.0 (SPSS Inc., Chicago, IL, USA). All variables were presented as means and standard deviation. For the continuous variables, first of all, parametric test conditions were tested. Kolmogorov-Smirnov test was used to see whether the continuous variables were normally distributed. Paired Sample T Test were used to compare pre-test and post-test score in treatment and control groups. A two-sided p value < 0.05 was considered significant for all analyses. As a result, there are significant differences found between anthropometric measurements and grip strength of the children after the swimming training.
Key Words: Swimming Education, Training, Anthropometric Measurement, Handgrip Strength

DÜZENLİ YÜZME EĞİTİMİNİN ÇOCUKLARIN BAZI ANTROPOMETRİK PARAMETRELER VE EL KAVRAMA KUVVETİ ÜZERİNE ETKİSİ

ÖZET

Bu çalışmada; 12 haftalık düzenli temel yüzme antrenmanlarının 8-10 yaş erkek çocuklarında bazı antropometrik ölçümler ve el pençe kuvvetlerine etkisinin incelenmesi amaçlanmıştır. Araştırmaya 8-10 yaşlarında 96 erkek çocuk katıldı. Çocuklardan 48'i kontrol grubunu, 48'i da deney grubunu oluşturmuştur. Deney grubunda yer alan 48 çocuktan 12 hafta devam edecek olan temel yüzme antrenmanlarına başlanmadan önce ön test, antrenmanlar bitiminde ise son test ölçümleri alınmıştır. Kontrol grubunda yer alan 48 çocuktan ise deney grubuyla eş zamanlı ön test ve son test ölçümleri alınmış bu gruptaki çocuklara herhangi bir antrenman yaptırılmamıştır. Deney grubuna 12 hafta süreyle haftada üç gün ve günde 60 dakika olmak üzere tam dinlenme ilkesine uygun şekilde temel yüzme antrenmanları yaptırılmıştır.

Çalışmadan elde edilen verilerin değerlendirilmesi ve tabloların oluşturulması amacıyla SPSS (Statistical Package for Social Sciences) 15.00 paket programı kullanılmıştır. Tüm değişkenler ortalama ve standart sapma olarak sunuldu. Sürekli değişkenler için öncelikle parametrik test koşulları test edilmiştir. Kolmogorov-Smirnov testi sürekli değişkenlerin normal dağılım gösterip göstermediğini göstermek için kullanılmıştır. Deney ve kontrol gruplarında ilk ve son test skorlarını karşılaştırmak için eşleştirilmiş örneklem T testi (Paired Sample T Test) kullanılmıştır. Tüm analizler için çift yönlü p değeri <0.05 olarak düşünülmüştür Sonuç olarak düzenli yapılan yüzme antrenmanı sonrasında çocukların antropometrik ölçümleri ve el kavrama kuvvetleri arasında anlamlı farklılıklara rastlanmıştır.
Anahtar kelimeler: Yüzme Antrenman, Antropometrik ölçümler, Pençe Kuvveti

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INTRODUCTION

Swimming is the whole movements done by individual in order to cover a specific distance in water. Sportive swimming is defined as the athlete's skill of covering a specific distance in shortest time in water. Swimming branch is a sport branch whose risk of injury is less than other branches and a branch that can contribute to the development of motoric features. In order to get sportive efficiency from this branch, the athlete candidate should start in early ages, be trained by a coach whose technical information is satisfying and be supported by family and school environment (1). Sport addiction should be obtained to children if a healthy and successful generation is wished. In contrast to other sports disciplines, swimming has the property of being a sport that is being made both in a non-normal environment, in the water, in a position not normal and also in the horizontal position. The water has a pressure effect on respiration. This effect makes difficult respiration instead of making easy. On the other hand, buoyancy of water meets force of gravity. Movements in the water face with much more resistance than movements in the air and inspiration and expiration must be adapted to the fathoms. if a healthy generation and a successful athlete mass are being targeted, the habit of sports to children must be provided.(2).

The movements of particular body parts during swimming have been artificially developed in the form of four swimming styles. Since the modern swimming strokes are not natural movements, learning them is a long process and requires permanent error correction. Each novice swimmer should, however, be allowed some degree of individualism in learning movement technique, which would account for individual somatic and physiological differences. Literature abounds in works documenting the dynamic development of swimming technique research. (3).

The examination of physiological characteristics of child athletes independent from growth and development periods can cause deceptive results. One of the main characteristics of childhood is the growth and development process in this period. Development and growth characteristics that change in the childhood and adolescence should be taken into account in forming the physiological standards of child athletes, in evaluating the results of performance tests and in choosing skill (4). Physical sufficiency is as important as skill in every sport branch. Thus, studies based on scientific data that research physical and physiological profile for sport branches have been increasing day by day. It is believed that sport and exercise is not only effective in development of adults but also in development of children (5). It is known that the growth and development of swimmer children are normal (6) and that biological age of swimmers is higher than other people of the same age (7).

Even though it is known that physical activities are helpful in terms of health (8,2), it is also known that there is decrease in children's physical activities as age increases (9,10). Corder et al. observed in their study on English children aged 9-10 that physical activities which are out of school decreased significantly (11). On the other hand, there were many positive results from many researches on the effect of swimming sports on children. In fact, Beggs et al. put forward that swimming education decreased the negative effects of chronic diseases such as asthma (12). The increase in the number of studies on the effect of swimming education on children will provide coaches and families with informative results.

Swimming is different from other sports branches as exercise. The clearest different of swimming is spending energy in order to provide horizontal movement by using arms and legs at the same time

but independent from each other (13). Synchronized movement of legs and arms is also important in addition to active role of all muscles in swimming branch. It is very important to determine the effect of swimming training on children whose development process is rapid. This study aims to examine the effect of swimming training on the anthropometric features and handgrip strength of children aged 8-10.

MATERIALS and METHODS

96 voluntary male children (48 are subject and 48 are in the control group) aged 8-10 attended the research. The average age of students in the subject group was 8,19±0,79 (years) and the average age of students in the control group was 8,50±1,40 (years). Basic swimming education was given in line with complete recovery principle to the experimental group for 12 weeks-three days a week and 60 minutes a day On the other hand, the control group did not make a regular exercise. Pretest and posttest measurements were taken from the groups. The body weight of the participants was measured by electronic scale at 0,1 kg precision with minimum clothing (14). Circumference measurements were taken from biceps at extension and biceps and forearm areas at flexion. The handgrip strength of the subjects was measured at the position of 45 angle by Takkei hand dynamometer and recorded as kg (15).

The statistical analyses were performed using the Statistical Package for the Social Sciences version 15.0 (SPSS Inc., Chicago, IL, USA). All variables were presented as means and standard deviation. For the continuous variables, first of all, parametric test conditions were tested. Kolmogorov-Smirnov test was used to see whether the continuous variables were normally distributed. Paired Sample T Test were used to compare pre-test and post-test score in treatment and control groups. A two-sided p value < 0.05 was considered significant for all analyses.

RESULTS

Table 1: The comparison of the measurements of control group and subject group students

Test	Group	Before	After	T	P value
Flexional Biceps	Treatment	19.3 ± 2.3	21.4 ± 2.4	-4.617	**<0.001**
	Control	20.8 ± 2.3	19.8 ± 3.0	1.435	0.161
Biceps in Extension	Treatment	18.4 ± 2.2	19.6 ± 1.9	-2.971	**0.005**
	Control	19.1 ± 2.0	18.5 ± 2.5	0.997	0.326
Forearm Circumference	Treatment	18.5 ± 1.4	18.7 ± 1.6	-0.610	0.545
	Control	19.4 ± 2.4	17.7 ± 2.2	3.148	**0.003**
Handgrip	Treatment	19.4 ± 5.1	21.2 ± 4.8	-1.707	0.095
	Control	18.6 ± 5.2	15.5 ± 7.4	2.199	**0.035**

T: Paired sample T test

When we examine the average values of the anthropometric measurements of the athletes, it is observed that the posttest values (21.4±2.4) of Flexion Biceps were significantly higher than the pretest values of (19.3±2.3) Flexion

Biceps. The posttest values (19.6±1.9) of Extension Biceps were significantly higher than the pretest values of (18.4±2.2) Extension Biceps. Even though the posttest values (18.7±1.6) of forearm circumference were higher than the pretest values (18.5±1.4), there was not observed a statistically significant difference. The pretest values (20.8±2.3) of Flexion Biceps of the children in the control group were higher than the posttest values (19.8±3.0). The pretest (19.1±2.0) values of Extension Biceps were higher than the posttest values (18.5±2.5). The pretest values (19.4±2.4) of the forearm circumferences were significantly higher than the posttest values (17.7±2.2).

There were no significant differences found between pretest and posttest handgrip scores. As for the control group, the posttest handgrip values (15.5±7.4) were found significantly lower than the pretest handgrip values (18.6±5.2).

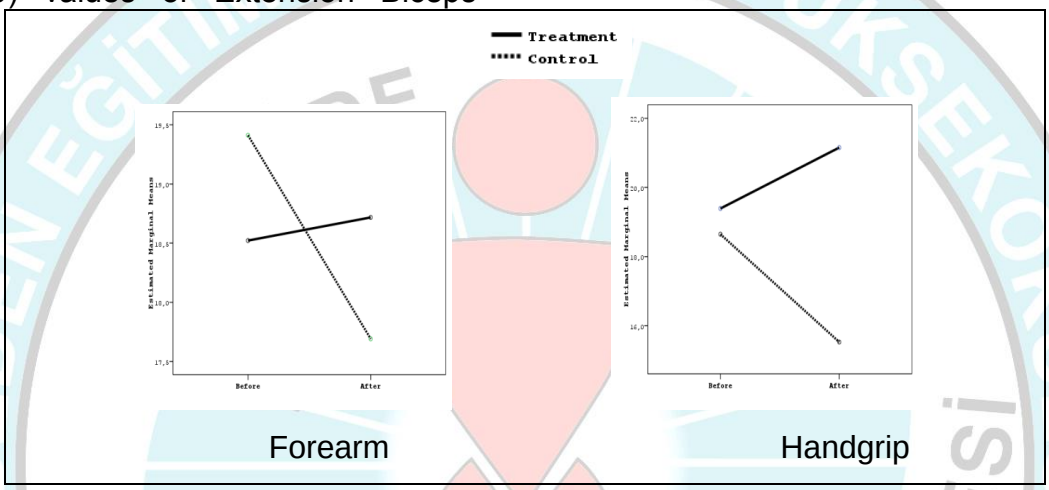

Figure 1. The change of pre-measurements and post-measurements of the Experimental and Control Groups

In the study, there was observed an increase in the forearm circumference of the children in the experimental group whereas a decrease was observed in the forearm circumference of the children in the control group. This result showed that training had positive effects on the forearm circumference measurements of children. Circumference measurements contain bone covered by a muscular tissue which is covered by subcutaneous fat deposit. Thus, circumference does not provide a direct muscle tissue measurement. As muscle is the main tissue that forms circumference, arm and leg circumferences are used to show relative muscular development (16). An increase was observed in the handgrip strength of the children in the experimental group between the pretest and posttest values. As for the children in the control group, their posttest values were lower than their pretest values.

DISCUSSION AND CONCLUSION

This study showed that 12-week basic swimming training had positive effects on the anthropometric measurements and handgrip strength of children aged 8-10. There are studies that support our study in this field as well as there are studies that had opposite results. The fact that swimming training affects the development of children has been put forward by many studies.

Vajda and Mezsaros found in their research on male and female swimmers aged 10-11 that there was statistically

significant difference between the pretest and posttest values after 20-week training program (17). Similarly, Zsofia and Janos found in their 12-week training program on male swimmers aged 7 that there was statistically significant difference between the pretest and posttest values of body weight (18).

Seiler et al. found in their study on swimmers aged 13 that handgrip strength was significant in the group who did land training whereas it was not significant in the other group after 6-month study (19). Odabaş found in his research on male and female swimmers aged 7-12 that there was statistically insignificant difference between the pretest and posttest values of handgrip strength after 12-week study(20).

Smith found a statistically significant difference in the arm and forearm circumference development of 190 swimmers aged 11-17 after a 6-month study (21). Girold et al. found in their study on 120 swimmers aged 10-12 that there were some significant differences between the shoulder circumference development of the swimmers who did land training and who did not land training in terms of some circumference parameters after a 12-week training program (22). Also, Eremeev et al. found in their study on 95 students that there was statistically significant difference between the pretest and posttest values of arm and forearm circumference after a 3-month swimming training program (23). Also, Kellett et al. found in their 3-month research on 80 male and female swimmers aged 10-12 that there was statistically significant difference between the pretest and posttest of circumference parameters of the male and female swimmers in the control group (24), which supports the results of our research.

According to these results, it is observed that 12-week regular basic swimming education has significant positive effects on children's some anthropometric values and handgrip strengths.

REFERENCES

1. Günay, E. “The Effect Of Regular Swimming Practice On The Children's Physical And Physiological Parameters” Master thesis, Gazi University Graduate School of Health Sciences, Ankara. 2007. [In Turkish with English Abstract]
2. Warburton, D.E., Nicol, C.W., Bredin, S.S. “Health benefits of physical activity: the evidence” CMAJ; 174:801–809. 2006.
3. Jerszynski, D., Antosiak-Cyrak, K., Habiera, M., Wochna, K., Rostkowska, E. “Changes in Selected Parameters of Swimming Technique in the Back Crawl and the Front Crawl in Young Novice Swimmers” Journal of Human Kinetics volume 37, 161-171. 2013.
4. Koşar, N.Ş., Demirel, H.A. “Physiological characteristics of child athletes” Acta Orthop Traumatol Turc, ;38 Suppl 1:1-15. 2004.
5. Taşgın, E., Dönmez, N. “The Effect of the Exercise Program Applied the Children between 10 and 16 Ages on the Parameters of Respiratory” Selçuk University Journal of Physical Education and Sport Science; 11(2): 13–16. 2009. [In Turkish with English Abstract]
6. Theintz, G.E., Howald, H., Weiss, U., Sizonenko, P.C. “Evidence for a reduction of growth potential in adolescent female gymnasts” J Pediatr;122:306-13. 1993.
7. Wawrzyniak, G. “Biological age in children who practise swimming” Anthropol Anz;59:149-56. 2001.
8. Department of Health “At least five a week: evidence on the impact of physical activity and its relationship to health”. London, Department of Health. 2004.
9. Janz, K.F., Burns, T.L., Levy, S.M. “Iowa Bone Development Study: Tracking of activity and sedentary behaviors in childhood: the Iowa Bone Development Study” Am J Prev Med;29:171–178. 2005.
10. Raudsepp, L., Neissaar, I., Kull, M. “Longitudinal stability of sedentary behaviors and physical activity during early adolescence” Pediatr Exerc Sci;20:251–262. 2008.
11. Corder, K., van Sluijs, E.M., Ekelund, U., Jones, A.P., Griffin, S.J. “Changes in children's physical activity over 12 months: longitudinal results from the speedy study” Pediatrics;126:e926–e935. 9. 2010.

12. Beggs, S., Foong, Y.C., Le, H.C., Noor, D. Wood-Baker R, Walters JA. "Swimming training for asthma in children and adolescents aged 18 years and under" Cochrane Database Syst Rev. Apr 30;4:CD009607. 2013.

13. Göksu, Ö., Yüksek, S. "Effect Of The Applying Dynamic Streching Exercises Development To Flexibility Age Of The Between 10-12 Years Female Swimmers" İstanbul University Journal of Physical Education and Sport Science, 11;3. S;62-67. 2003. [In Turkish with English Abstract]

14. Zorba, E. "Vücut Yapısı Ölçüm Yöntemleri ve Şişmanlıkla Başa Çıkma" Morpa Kültür Yayınları Ltd.Ş.S: İstanbul. 17,18, 39–48,71–81, 107–135. 2006. [In Turkish]

15. Tamer, K. "Sporda Fiziksel-Fizyolojik Performans Ölçülmesi ve Değerlendirilmesi" Bağırgan Yayımevi, Ankara; 36, 138–185. 2000. [In Turkish]

16. Malina, R. M., Bouchard, T. "Somatic Grovvth, Grovvth, Maturation and Physical Activity" Champaign, Human Kinetics. 1991.

17. Vajda, I., Meszaros, J. "Effects of 3 hours a week of physical activity on body fat and cardiorespiratory parameters in boys and girls" Acta Physiol Hung. PMID: 17853771 PubMed - indexed for Medlıne. 2007.

18. Zsofia, A., Janos, T. "Swimming training after changes of body seven years old boys" J Physiol Anthropol. Romanya. 2007.

19. Seiler, S., De Koning, J.J., Foster, C. "The fall and rise of the gender difference in elite swimmers anaerobic performance" Med journal of sports England. 2006.

20. Odabaş, B. "The Effects of the 12-week swimming basic training 7-12 year-old Kids physical and motoric characteristics of male and female swimmers"Kocaeli University Graduate School of Health Sciences, School of Physical Education and Sports, Kocaeli. 2003. [In Turkish with English Abstract]

21. Smith, L. "Anthropometric measurements, and arm and leg speed performance of male and female swimmers as predictors of swim speed" J Sports Med Phys Fitness. Jun;18(2):153-68. 1978.

22. Girold, S., Maurin, D., Dugue,B., Chatard, J.C., Millet, G. "Effects of dry-land vs. resisted- and assisted-sprint exercises on swimming sprint performances" J Strength Cond Res. May;21(2):599-605. 2007.

23. Eremeev, V., Sivkov, I.G. "Effect of swimming on the physical development and health status of preschool children" Gig Sanit, Nov;(11):75-6. 1986.

24. Kellett, D.W., Willan, P.L., Bagnall, K.M. "A study of potential Olympic swimmers. Part Changes due to three months intensive training" Br J Sports Med. Jun;12(2):87-92. 1978.