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## THE EFFECT OF COMBINED TRAINING ON SOME CONDITIONAL PARAMETERS OF BASKETBALL PLAYERS AGED 12-14

Pelin Aksen<sup>1</sup>, Mehmet Günay<sup>2</sup>

<sup>1</sup>School of Physical Education and Sports, Kastamonu University, Kastamonu, TURKEY

<sup>2</sup>School of Physical Education and Sports, Gazi University, Teknikokullar, Ankara, TURKEY

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### Abstract

This research has been performed on 34 volunteer male basketball players aged 12-14 age groups from junior male basketball team of Ankara University and Ulaştırma Sports Club. The subjects have been randomly divided into the experimental and control groups. Before training program resting heart rate, systolic-diastolic blood pressure, aerobic-anaerobic capacity have been evaluated for both groups, besides some measurements have been also performed on some parameters by using Eurofit test battery. The same measurements have been performed again after the 8 weeks combined training program for the experimental group and the effect of combined trainings on these parameters has been tried to determine. In this 8 weeks period, the subjects in the control group have not been put to an extra training program, they have carried on their daily sports life.

SPSS 8.0 statistical package program has been used for the statistical analysis and arithmetic average, standart deviation, standart error and range of the values have been determined. The differences between groups have been examined by t-test in the significance level 0.01 and 0.05.

In consequence of this research, it has been observed that while the values of body height (% 0,61 ; p <.001), leg power (% 17,21 ; p <.001), pull-up motion (% 32,06 ; p <.001), standing long jump (% 6,85 ; p <.001) and aerobic capacity (% 8,65 ; p <.001) have showed an increase, the values of resting heart rates (% 7,71; p <.005), 10 x 5 m. (% 13,15 ; p <.001) and left hand reaction time to light (% 7,31; p <.0005) have showed a decrease after the first and the last measurements of combined training program for the experimental group. It has not been observed any changes in the control group.

As a result, it has been determined that the combined trainings performed on experimental group have been more efficient than technical trainings.

Key Words: Eurofit Tests, Combined Training, Training in Children, Basketball.

### Purpose

The aim of the training for the kids and the young is to provide the development of sportive performance with the means of training science and pedagogical.

The contents of training for the kids have been determined in accordance with the principles which have been stipulated by the sports science and the features of their development period.

The aim of this research is to investigate the effect of the 8 weeks combined basketball trainings on the development of some technical and conditional parameters of the male basketball players aged 12-14.

### Method

This research has been performed on male basketball players aged 12-14 exercising regularly from junior male basketball team of Ankara University and Ulaştırma Sports Club.

In the experimental group there have been 17 male athletes from junior male basketball team of Ankara University, whose mean age was 13,47±1.12 years, mean height was 163±0.05 cm, mean weight was 53,38±11.10 kg. Before the research, the values of all subjects like weight and height measurement, resting heart rate, systolic and diastolic blood pressure, 30 m sprint, reaction time, leg strength, push-up,

shuttle run test, vertical jumping and anaerobic power measurement have been determined and in addition to these they have been put through Eurofit test.

Subsequently these subjects have been put to combined training, which has been performed for 8 weeks and 4 days a week, lasting approximately 90 minutes per day. After 8 weeks these parameters measured at the beginning have been performed again.

In the control group there have been 17 male subjects from Ulaştırma Sports Club whose mean age was  $13,17 \pm 1.15$  years, mean height was  $159 \pm 0.12$  cm, mean weight was  $50,59 \pm 14.10$  kg. All of the tests have been also performed to the control group like the experimental group but before the combined training pre test and post test measurement have been performed for this group.

#### Measurement Methods:

##### 1. Weight and Height Measurement

##### 2. Blood Pressure and Heart Rate

**Measurement:** The values have been measured by using Test BM 2001 branded sphygmomanometer. Two measurements have been performed and the best one has been recorded.

**3. Percent Body Fat Measurement:** Four skinfolds (biceps, triceps, subscapular and supra-iliac) have been measured on the right side of the body. Body fat has been calculated using Sloan ve Weir's Formula

Body density (gr/ml) =  $1.1043 - 0.00133 (\text{leg SF}) - 0.00131 (\text{subscapular SF})$

Percent Body Fat Measurement =  $(4.57 / \text{density} - 4.142) \times 100$

E = 0.0082 (M.C. Şipal, 1989, K. Tamer, 2000)

**4. 10 x 5 m Shuttle Test Measurement:** Marker cones and/or lines are placed five meters apart. Start with a foot at one marker. When instructed by the timer, the subject runs to the opposite marker, turns and returns to the starting line. This is repeated five times without stopping (covering 50 meters total). At each marker both feet must fully cross the line.

**5. 30 m Sprint Measurement:** Measured with using photocell.

**6. Reaction Time Measurement:** "Power 2000 Newtest" branded multiple choice reaction time measure has been used for evaluating the reaction times of the subjects to the sound and the light. Every test has been performed five times and the best and the worst values have been removed. Average of the remained three values has been calculated and recorded (K. Tamer, 2000).

**7. Leg Strength Measurement:** With using the dynamometer.

**8. Bent Arm Hang Measurement:** The subject has been assisted into position, the body lifted to a height so that the chin is level with the horizontal bar. The bar has been grasped using an overhand grip (palms are facing away from body), with the hands shoulder width apart. The timing has started when the subject has been released. The subject has attempted to hold this position as long as possible and maximum time has been recorded as 1/10 second (A. Kamar, 2003, M.C. Şipal, 1989)

**9. Sit-Up Measurement:** The maximum number of correctly performed sit-ups in 30 seconds has been recorded.

**10. Push-up Measurement:** The push-up number with the right technique (bending and stretching the arms fully) has been calculated (Y. Sevim, 2002).

**11. Hand Grip Strength Measurement:** With adjustable handle dynamometer from dominant hands and recorded as kilograms.

**12. Standing Long Jump Test (Broad Jump):** The athlete has stood behind a line marked on the ground with feet slightly apart. A two foot take-off and landing has been used, with swinging of the arms and bending of the knees to provide forward drive. The subject has attempted to jump as far as possible, landing on both feet without falling backwards. The better of two attempts has been recorded in centimeters (E. Erol, 1992, A. Kamar, 2003, O. Sevim, 2002, M.C. Şipal, 1989)

**13. Flamingo Balance Test:** Metal beam 50cm long, 5cm high and 3cm wide (the beam is stabilized by two supports at each end, and should have a non-slip surface) The subjects have stood on the beam. They have tried to keep balance. While balancing on the preferred leg, the free leg has been flexed at the knee and the foot of this leg held close to the buttocks. The measurement has been performed by calculating of the subject's number of attempts in a minute (A. Kamar, 2003, M.C. Şipal, 1989)

**14. Sit And Reach Flexibility Test:** The test has been performed twice and the better one has been recorded (A. Kamar, 2003, M.C. Şipal, 1989, K. Tamer, 2000).

**15. 20 m Multistage Fitness Test (Beep Test) Measurement:** This test involves continuous running between two lines 20m apart in time to recorded beeps. The value heard from the tape has been recorded when the subjects have stopped. According to these values, aerobic power value of the subjects (ml-kg/dk) has been acquired (A. Kamar, 2003, M.C. Şipal, 1989, K. Tamer, 2000).

**16. Vertical Jumping and Anaerobic Power Measurement:** It has been performed by using Vertec vertical jump tester. The anaerobic power of the subjects has been calculated with the formula below (K. Tamer, 2000).

$$P = (\sqrt{4.9} \times W \times \sqrt{D_n})$$

P = Anaerobic Power

D = Vertical Jumping Distance (m)

#### Statistical Analysis

SPSS 8.0 statistical package program has been used for the statistical analysis and arithmetic average (X), standart deviation (S), standart error (SH) and range of the values have been determined. The differences between groups have been examined by t-test in the significance level 0.01 and 0.05.

#### Result

When compared the conditional features between the group after pre and last tests applied for the experimental and control group. It is point out for the pre test that there were significantly differences at systolic blood pressure, heart beat, height, diastolic blood pressure, 30 m. sprint, left hand reaction time to sound, right hand reaction time to light, left hand reaction time to light, bent arm hang, sit-up, push-up, leg strength, aerobic-anaerobic power, standing long jump; on the contrary, there were not significantly differences at body weight, percent body fat, right hand reaction time to sound, 10x5 m., right and left hand grip strength, flamingo balance and sit and reach flexibility. It is determined for the last test applied for the experimental and control group that there were significantly differences at systolic blood pressure, heart beat, body weight, height, percent body fat, 10 x5 m., 30 m. sprint, right hand reaction time to light, left hand reaction time to sound, left hand reaction time to light, leg strength, bent arm hang, sit-up, push-up, standing long jump, aerobic-anaerobic power, sit and reach flexibility, on the other hand there weren't significantly differences at diastolic blood pressure, right hand reaction time to sound, right and left hand grip strength and flamingo balance.

When compared the conditional features after pre and last tests applied for the experimental group and the control group, it is point out that there were significantly differences at height, heart beat, 10x5 m., left hand reaction time to light, leg strength, standing long jump, aerobic power, sit-up for the experimental group. On the other hand, it is determined that there weren't significantly differences at body weight, systolic-diastolic blood pressure, percent body fat, 30 m. sprint, right hand reaction time to sound, left hand reaction time to sound, right hand reaction time to light, bent arm hang, push-up, right and left hand grip strength, flamingo balance, sit and reach flexibility, anaerobic power. It is point out for the control group that there were significantly differences at height, systolic blood pressure, 10x5 m., 30 m. sprint, right hand reaction time to sound, left hand reaction time to sound, right hand reaction time to light, left hand reaction time to light, push-up; on the contrary, there weren't significantly differences at body weight, diastolic blood pressure, heart beat, leg strength, bent arm hang, sit-up, right and left hand grip strength, standing long jump, sit and reach flexibility, aerobic and anaerobic power.

### Discussion and Conclusion

The research has been carried out to examine effect of combined training on some conditional features of 12-14 years basket ball players.

Average age of male athletes participating in the survey as experimental group;  $13.47 \pm 1.12$  years, average age of male athletes as control group;  $13.17 \pm 1.15$  years (n=17).

It has been observed that the body weight of experimental group rised from  $53.38 \pm 11.10$  kg to  $54.21 \pm 11.02$  kg. while the average height of them rised

from  $163 \pm 0.05$  cm to  $164 \pm 0.05$  cm. it has also determined that the body weight of control group rised from  $50.59 \pm 14.10$  kg to  $50.71 \pm 13.44$  kg. while the average height rised from  $159 \pm 0.12$  cm. to  $160 \pm 0.12$  cm. when compared first measurement and last measurement of both group, the body weight values were seen as nonsense statistically. While the height values were found logical statistically ( $p < 0.01$ ).

When compared interms of height and weight, the difference between two group is assumed meaningful statistically ( $p > 0.05$ )

The height and weight values of players participating in the survey are similar to the values explained in researches carried out by İ. Yazarer (2000), A. Şen (2003), E. Erol and his colleagues (1999). The rise of height may be related to their development age.

When we compare first and last systolic and diastolic blood pressure measurements of experimental group; diastolic blood pressure of experimental group decreased from  $76.35 \pm 6.44$  mmHg to  $72.06 \pm 8.74$  mmHg ( $p > 0.05$ ), systolic blood pressure decreased from  $121.00 \pm 16.01$  mmHg to  $118.06 \pm 15.28$  mmHg ( $p > 0.05$ ). While diastolic blood pressure of control group increased from  $70.35 \pm 6.42$  mmHg to  $70.41 \pm 6.49$  mmHg systolic blood pressure of them increased from  $107.47 \pm 10.91$  mmHg to  $110.88 \pm 14.77$  mmHg ( $p < 0.05$ ).

As a result of statistical evaluation, there is a significant difference between experimental group and control group first measurement of systolic ( $p < 0.01$ ), diastolic ( $p < 0.05$ ) interms of but it isn't the same for the some measurements after the training program ( $p > 0.05$ ). the result of our research seems parallelism with those carried out with the same age group by N. Dedekargınoğlu (1992), S. Maraşlı (1997), H. Şahin (1999).

It can be said that, blood pressure reduction occurring as a result of the exercise can happen from decrease of the body fat and increase of aerobic power. It has been seen first values of experimental group resting heart beat is;  $88.41 \pm 12.99$  beat/minute but in the second measurement this value decreased to  $81.59 \pm 9.88$  beat/minute. First measurement of the control group was  $69.65 \pm 5.61$  beat/minute but after the training; it increased to  $70.65 \pm 6.60$  beat/minute.

When we compare experimental group and control group it was found that there was a significant difference between first and last measurements ( $p < 0.01$ ). The results of our research show similarities with results of those carried on the same age group by Z. Çelik (2003), İ. Yazarer (2000), E. Erol and his friends (1999).

Being the rate of heart beat lower than normal dispersal level is the most obvious sign of cardiovascular endurance. The low pulse volume of girls and boys during resting and exercise is evaluated that they have high heart beat rate. Especially systolic pressure values of young during exercises are relatively lower than adults. Both increasing aerobic power and decrease of blood pressure effects endurance performance of training.

At the end of the research a significant difference couldn't been found control group's between first and last measurements of triceps, biceps, subscapula, suprailac and calf skinfold and experimental group's ( $p>0.05$ ).

Experimental and control group's first measurement results of triceps, biceps, subscapula, suprailac and calf skinfold are not seen as statistically meaningful ( $p>0.05$ ) while last measurement results are seen ( $p<0.01$ ). the results of the research show parallelism with similar studies M. Loğoğlu (2002), H. Uzuncan (1999).

According to results of the research, there is no important difference between first and last values of experiment group's body fat percentage aren't statistically meaningful ( $p>0.05$ ) whilst last measurements are ( $p<0.01$ ) in the research it was found that measurements on body fat percentage; first values taken  $4.32\pm 1.05$  dropped with a 17.12 % rate ( $3.58\pm 1.12$ ) after 8 weeks training program. Compared these values with studies on the same age level, we can see similarities N. Dedekarginoğlu (1992), A. Şen (2003), İ. Cicioğlu, (1995).

Destructing large amount of calories, training causes a decrease in the percentage of body fat (M. Günay, H. Koç, 2000). Decrease of body fat percentage occurring with training is due to biological adaptation to the training and fat metabolism causing an increase in fat oxidation (M. Günay, M. Onay, 1999). Also, contrary to the increase in body weight, decrease of body fat means that there is a development in muscle mass (M. Onay, 1993).

At the end of the research in 10x5 m. measurements of experimental group, first measurements were calculated as  $20.29\pm 1.66$  second whilst last measurements were calculated  $17.62\pm 0.69$  second ( $p<0.01$ ). There was no important difference in the same measurements on control group inters of first and last measurements ( $p>0.05$ ).

First measurements results has no sense statistically ( $p>0.05$ ) whilst last measurement results are statistically meaningful ( $p<0.01$ ) when we compare 10x5 m. measurement of experimental and control group. The result seems similar to some other studies (H. Uzuncan, 1991, İ. Demir, 2001).

Obtained from the study first and last measurements of 30 m. sprint were statistically senseless ( $p>0.05$ ). it was found in the study that first 30 m. sprint measurements ( $5.19\pm 0.48$ ) dropped after 8 weeks training program at a 34 % rate ( $5.12\pm 0.69$ ). Measurement results shows similarities with Z. Çelik (2003) and F. A. Duman (2002)'s studies.

In our study, first and last measurement results of the reaction time to the right and left hand sound were found statistically trivial ( $p>0.05$ ).

It was pointed that reaction time can be developed with regular trainings (T.O. Bompa, 1998). First ( $p<0.05$ ) and last ( $p<0.01$ ) measurement values of right hand reaction time to light between groups were found statistically significant.

In experimental group, first and last measurement values of left hand reaction time to light were found statistically important ( $p<0.05$ ) but in control group, they were found senseless ( $p>0.05$ ). Results of the study show parallelism to the study covering the same age group carried out by H. Şahin, (1999).

Reaction time is an important performance measure showing speed and effect of decision making against any outside stimuli and alsı is an significant factor in starting explosive acts (O. İmamoğlu, A.F. Ağaoğlu, Y.S. Ağaoğlu, 2000). It is natural that with trainings athletes have better reaction times because the time last during the process including observation, identification and assessment of the stimuli and giving order muscles to response will be shorter with training (S. Orhan, 2001).

In our study we find and last measurement result of leg strength of the experimental group meaningful ( $p<0.01$ ) whilst we find the same measurements of control group irrelevant ( $p<0.05$ ). First and last leg strenght measurement results were regarded important compared experimental and control groups. Results of the study show parallelism to the study covering the same age group carried out by M. Loğoğlu (2002).

First and last measurement result of hanging with bent arm were assumed as trivial in both groups ( $p>0.05$ ). However, when it comes to inter-groups, the measurement results were evaluated as important ( $p<0.01$ ). Results have similarities with the study of H. Uzuncan (1991) and M. Loğoğlu (2002) which concerned with the same age group.

Sit up movements done by experimental groups gave statistically logical results when first and last measurement values taken into consideration ( $p<0.01$ ). But, it isn't right to say the same for the control group ( $p>0.05$ ). on the other hand, inter-group first and last results seemed statistically significant ( $p<0.01$ ). Result of our study show similarities to same identical studies (İ. Cicioğlu, 1995, Z. Çelik, 2003).

In the study, first and last measurements of push up movement done by experimental group didn't give substantial results ( $p>0.05$ ) while the results of the control group were found statistically logical ( $p<0.05$ ). When we compare first and last measurements of the groups, results were thought statistically meaningful ( $p<0.01$ ). Results of the study show parallelism with F.A. Duman (2002)'s study on the same age group.

First and last measurement results of right and left handgrip strength performed by experimental and control group were found senseless ( $p>0.05$ ). Results have similarities with some studies (S. İbiş, 2002, İ. Yazarer, 2000).

It is reported that hand dynamometer in Eurofit tests serves to determine arm strength moreover, arm strength can be increased by training and it is available in those who do regular exercises (M. Pense, 1996). In our study first and last measurements results of standing broad jump performed by experimental

group were found statistically important ( $p < 0.01$ ) while results of the same act performed by control group were statistically senseless ( $p > 0.05$ ). First ( $p < 0.05$ ) and last ( $p < 0.01$ ) measurement results between groups were considered statistically valuable. These values show similarity the study carried out by Ö. Şenel (1995) ve İ. Demir (2001).

Increases in leg strength, sit up and anaerobic parameters may result from the effect of training on strength. First and last measurement results of balance conducted an experimental and control groups were regarded statistically senseless ( $p > 0.05$ ). In our study measurements of balance showed that first that first measurement values ( $13.24 \pm 7.81$ ) increased at a 28.31 % rate ( $18.47 \pm 13.29$ ) after 8 weeks training program. Results of the study seems similarity to some similar studies (İ. Demir, 2001, M. Loğoğlu, 2002).

First and last measurement results of flexibility conducted on experimental and control group were considered statistically trivial ( $p > 0.05$ ). But when we compare groups interns of first and last measurements. We regard first results statistically unimportant ( $p < 0.05$ ) second results statistically important ( $p < 0.05$ ). Results of the study show parallelism with other similar studies E. Erol (1995), H. Şahin (1999), Ö. Şenel (1995).

Flexibility isn't only a indicator of the coordination of condition in a healthy body but also it depends on strength and body shape. Flexibility of the body may vary depending on person's activity and it's reported that flexibility increases obviously in those who particopet activity in sport (M. Pense, 1996).

In our study, first and last measurements result of aerobic power conducted on experimental group were found statistically significant ( $p < 0.01$ ) while that of control group were found statistically invaluable ( $p > 0.05$ ). When we compare first and last measurements between groups we see results statistically important ( $p < 0.01$ ). results of the study show parallelism with some similar studies (N. Dedekargınoğlu (1992), S. Maraşlı (1997). There was

no development in control group interns of aerobic capacity. That may result from the experimental group training based on developing technical capacity.

Increase in Max  $VO_2$  directly depends on frequency, severity and duration of the training. Depending on quality and quantity, development in  $VO_2$  may be in the range of 8 %-30% (E. Erol, 1995).

Strength training with regular and increasing weight develops athletes' aerobic powers. However, the development may vary depending on various factors. It is possible that some athletes may be effected different than others (H. Demir, 1996).

According to Akgün, Holman (1972) points that aerobic power increase after 12 years and especially between 11-15 ages maximal aerobic capacity increase logically and generally the biggest influence any endurance training on aerobic capacity occurs repid growth period.

After 8 weeks training program in our study, when we compare first and last measurement results of anaerobic power conducted on experimental and control groups, results seem statistically trial ( $p > 0.05$ ). However when we compare group results, it can be said that measurement results are statistically important ( $p < 0.01$ ). Results of our study show parallelism with some similar studies (İ. Cicioğlu, 1995, S. İbiş, 2002, E. Erol, 1995).

That the highest anaerobic power come out from the group which have combined training may be due the feet that it gives place to basic motor features like strength, speed, endurance and vertical jumping leg strength. The team conducted a combined training program has better averages than a team conducted a normal training program because they develop their motor abilities in a versatile and technical very during they pre paratuar period (Z. Çelik, 2003). This result means that sports like basketball reguries combined training program. All in all, it can be said that combined training is more effective than technical training.

**Table 1: The Comparison of Physical and Conditional Features After Pre and Last Tests Applied For The Experimental and Control Group**

| Variables  | Groups       |           | N  | $\bar{X}$ | SH    | T        | Difference % |
|--|--------------|-----------|----|-----------|-------|----------|--------------|
| <b>Weight Measurement<br/>(Kg)</b>                         | Experimental | Pre Test  | 17 | 53,38     | 11,10 | -1,921   | 1,38         |
|  |              | Last Test | 17 | 54,21     | 11,02 |          |              |
|  | Control      | Pre Test  | 17 | 50,59     | 14,10 | -0,255   | 0,23         |
|  |              | Last Test | 17 | 50,71     | 13,44 |          |              |
| <b>Height Measurement<br/>(cm)</b>                         | Experimental | Pre Test  | 17 | 163       | 0,05  | -4,315** | 0,61         |
|  |              | Last Test | 17 | 164       | 0,05  |          |              |
|  | Control      | Pre Test  | 17 | 159       | 0,12  | -3,771** | 0,62         |
|  |              | Last Test | 17 | 160       | 0,12  |          |              |
| <b>Diastolic Blood<br/>Pressure (mm Hg)</b>                | Experimental | Pre Test  | 17 | 76,35     | 6,44  | 1,640    | 5,61         |
|  |              | Last Test | 17 | 72,06     | 8,74  |          |              |
|  | Control      | Pre Test  | 17 | 70,35     | 6,42  | -0,293   | 0,08         |
|  |              | Last Test | 17 | 70,41     | 6,49  |          |              |
| <b>Sistolic Blood<br/>Pressure (mm Hg)</b>                 | Experimental | Pre Test  | 17 | 121,00    | 16,01 | 0,750    | 2,42         |
|  |              | Last Test | 17 | 118,06    | 15,28 |          |              |
|  | Control      | Pre Test  | 17 | 107,47    | 10,92 | -2,154*  | 3,17         |
|  |              | Last Test | 17 | 110,88    | 14,77 |          |              |
| <b>Heart Beat<br/>(beat/min)</b>                           | Experimental | Pre Test  | 17 | 88,41     | 12,99 | 2,217*   | 7,71         |
|  |              | Last Test | 17 | 81,59     | 9,88  |          |              |
|  | Control      | Pre Test  | 17 | 69,65     | 5,61  | -1,844   | 1,43         |
|  |              | Last Test | 17 | 70,65     | 6,60  |          |              |
| <b>Percent Body Fat<br/>(%)</b>                            | Experimental | Pre Test  | 17 | 4,32      | 1,05  | 5,676    | 17,12        |
|  |              | Last Test | 17 | 3,58      | 1,12  |          |              |
|  | Control      | Pre Test  | 17 | 2,64      | 0,72  | -2,004   | 10,98        |
|  |              | Last Test | 17 | 2,93      | 0,66  |          |              |
| <b>10 x 5 m.<br/>(sec)</b>                                 | Experimental | Pre Test  | 17 | 20,29     | 1,66  | 6,134**  | 13,15        |
|  |              | Last Test | 17 | 17,62     | 0,69  |          |              |
|  | Control      | Pre Test  | 17 | 19,39     | 1,29  | 0,593    | 0,10         |
|  |              | Last Test | 17 | 19,37     | 1,32  |          |              |
| <b>30 m. Sprint<br/>(msn)</b>                              | Experimental | Pre Test  | 17 | 5,19      | 0,48  | 0,571    | 1,34         |
|  |              | Last Test | 17 | 5,12      | 0,685 |          |              |
|  | Control      | Pre Test  | 17 | 6,16      | 0,76  | -1,232   | 0,16         |
|  |              | Last Test | 17 | 6,16      | 0,76  |          |              |
| <b>Right Hand<br/>Reaction Time To<br/>Sound<br/>(msn)</b> | Experimental | Pre Test  | 17 | 242,35    | 63,01 | -1,409   | 11,28        |
|  |              | Last Test | 17 | 215,00    | 77,07 |          |              |
|  | Control      | Pre Test  | 17 | 209,94    | 43,03 | -3,733   | 21,68        |
|  |              | Last Test | 17 | 255,47    | 49,56 |          |              |
| <b>Left Hand Reaction<br/>Time To Sound<br/>(msn)</b>      | Experimental | Pre Test  | 17 | 209,71    | 34,55 | -1,245   | 7,04         |
|  |              | Last Test | 17 | 194,94    | 48,87 |          |              |
|  | Control      | Pre Test  | 17 | 224,18    | 47,17 | -1,938   | 14,24        |
|  |              | Last Test | 17 | 256,12    | 50,38 |          |              |
| <b>Right Hand<br/>Reaction Time To<br/>Light<br/>(msn)</b> | Experimental | Pre Test  | 17 | 219,71    | 42,40 | 0,356    | 2,27         |
|  |              | Last Test | 17 | 214,71    | 23,39 |          |              |
|  | Control      | Pre Test  | 17 | 256,59    | 39,57 | -0,932   | 4,60         |
|  |              | Last Test | 17 | 268,41    | 51,69 |          |              |
| <b>Left Hand Reaction<br/>Time To Light<br/>(msn)</b>      | Experimental | Pre Test  | 17 | 227,71    | 37,54 | 2,229*   | 7,31         |
|  |              | Last Test | 17 | 211,06    | 17,16 |          |              |
|  | Control      | Pre Test  | 17 | 263,88    | 49,38 | 0,823    | 5,08         |
|  |              | Last Test | 17 | 250,47    | 62,39 |          |              |
| <b>Leg Strength<br/>(kg)</b>                               | Experimental | Pre Test  | 17 | 49,38     | 16,02 | -3,130** | 17,21        |
|  |              | Last Test | 17 | 57,88     | 17,01 |          |              |
|  | Control      | Pre Test  | 17 | 45,50     | 19,71 | 0,000    | 0,00         |
|  |              | Last Test | 17 | 45,50     | 19,11 |          |              |
| <b>Bent Arm Hang<br/>(sec)</b>                             | Experimental | Pre Test  | 17 | 38,60     | 17,93 | -0,324   | 3,52         |
|  |              | Last Test | 17 | 39,96     | 19,23 |          |              |
|  | Control      | Pre Test  | 17 | 32,74     | 11,52 |          |              |

|  |              |           |    |        |       |          |       |
|--|--------------|-----------|----|--------|-------|----------|-------|
|  |              | Last Test | 17 | 32,65  | 11,23 | 0,411    | 0,27  |
| <b>Sit-up (number)</b>                     | Experimental | Pre Test  | 17 | 31,94  | 8,75  | -3,311** | 32,06 |
|  |              | Last Test | 17 | 42,18  | 7,74  |          |       |
|  | Control      | Pre Test  | 17 | 24,12  | 2,62  | 0,460    | 0,49  |
|  |              | Last Test | 17 | 24,00  | 2,76  |          |       |
| <b>Push-up (number)</b>                    | Experimental | Pre Test  | 17 | 32,82  | 7,02  | 1,271    | 8,07  |
|  |              | Last Test | 17 | 35,47  | 10,52 |          |       |
|  | Control      | Pre Test  | 17 | 25,94  | 7,15  | 2,519*   | 5,89  |
|  |              | Last Test | 17 | 24,41  | 6,53  |          |       |
| <b>Rightl Hand Grip Strength (kg)</b>      | Experimental | Pre Test  | 17 | 21,81  | 4,65  | -0,900   | 3,43  |
|  |              | Last Test | 17 | 22,56  | 5,53  |          |       |
|  | Control      | Pre Test  | 17 | 20,20  | 5,94  | 0,483    | 1,08  |
|  |              | Last Test | 17 | 19,98  | 5,19  |          |       |
| <b>Left Hand Grip Strength (kg)</b>        | Experimental | Pre Test  | 17 | 21,66  | 5,05  | -1,212   | 4,52  |
|  |              | Last Test | 17 | 22,64  | 6,33  |          |       |
|  | Control      | Pre Test  | 17 | 19,18  | 4,62  | -0,106   | 0,15  |
|  |              | Last Test | 17 | 19,21  | 4,47  |          |       |
| <b>Standing Long Jump Test (cm)</b>        | Experimental | Pre Test  | 17 | 200,00 | 20,38 | -4,538** | 6,85  |
|  |              | Last Test | 17 | 213,71 | 17,60 |          |       |
|  | Control      | Pre Test  | 17 | 179,62 | 28,06 | 0,000    | 0,00  |
|  |              | Last Test | 17 | 179,62 | 27,93 |          |       |
| <b>Flamingo Balance Test (sec)</b>         | Experimental | Pre Test  | 17 | 13,24  | 7,81  | -1,618   | 39,5  |
|  |              | Last Test | 17 | 18,47  | 13,39 |          |       |
|  | Control      | Pre Test  | 17 | 12,59  | 8,54  | -1,329   | 3,25  |
|  |              | Last Test | 17 | 13,00  | 7,97  |          |       |
| <b>Sit And Reach Flexibility Test (cm)</b> | Experimental | Pre Test  | 17 | 18,12  | 4,51  | -1,086   | 7,45  |
|  |              | Last Test | 17 | 19,47  | 6,10  |          |       |
|  | Control      | Pre Test  | 17 | 15,47  | 6,99  | 0,832    | 3,42  |
|  |              | Last Test | 17 | 14,94  | 5,79  |          |       |
| <b>Aerobic Power (ml.kg/min)</b>           | Experimental | Pre Test  | 17 | 67,21  | 8,90  | -4,096** | 8,65  |
|  |              | Last Test | 17 | 73,03  | 8,08  |          |       |
|  | Control      | Pre Test  | 17 | 62,95  | 10,95 | 1,731    | 1,41  |
|  |              | Last Test | 17 | 62,06  | 10,24 |          |       |
| <b>Anaerobic Power (kg.m/min)</b>          | Experimental | Pre Test  | 17 | 71,32  | 12,49 | 1,977    | 4,59  |
|  |              | Last Test | 17 | 74,60  | 15,10 |          |       |
|  | Control      | Pre Test  | 17 | 65,32  | 17,13 | -0,643   | 0,03  |
|  |              | Last Test | 17 | 65,34  | 17,14 |          |       |

\*\*p<0.01 \*p<0.05

**Table 2: The Comparison of Physical and Conditional Features Between The Groups After Pre and Last Tests Applied For The Experimental and Control Group**

| Variables                               | Groups       |           | N  | $\bar{X}$ | SH    | T       | Difference % |
|---|--------------|-----------|----|-----------|-------|---------|--------------|
| <b>Weight Measurement (Kg)</b>          | Experimental | Pre Test  | 17 | 53,38     | 11,10 | 2,021   | 5,22         |
|   |              | Last Test | 17 | 50,59     | 14,10 |         |              |
|   | Control      | Pre Test  | 17 | 54,21     | 11,02 | 2,253*  | 6,45         |
|   |              | Last Test | 17 | 50,71     | 13,44 |         |              |
| <b>Height Measurement (cm)</b>          | Experimental | Pre Test  | 17 | 163       | 0,05  | 2,176*  | 2,45         |
|   |              | Last Test | 17 | 159       | 0,12  |         |              |
|   | Control      | Pre Test  | 17 | 164       | 0,05  | 2,217*  | 2,43         |
|   |              | Last Test | 17 | 160       | 0,12  |         |              |
| <b>Diastolic Blood Pressure (mm Hg)</b> | Experimental | Pre Test  | 17 | 76,35     | 6,44  | 2,720*  | 7,85         |
|   |              | Last Test | 17 | 70,35     | 6,42  |         |              |
|   | Control      | Pre Test  | 17 | 72,06     | 8,74  | 0,624   | 2,28         |
|   |              | Last Test | 17 | 70,41     | 6,49  |         |              |
| <b>Sistolic Blood Pressure (mm Hg)</b>  | Experimental | Pre Test  | 17 | 121,00    | 16,01 | 5,006** | 11,18        |
|   |              | Last Test | 17 | 107,47    | 10,91 |         |              |

|  |              |           |    |        |       |          |       |
|--|--------------|-----------|----|--------|-------|----------|-------|
|  | Control      | Pre Test  | 17 | 118,06 | 15,28 | 3,332**  | 6,08  |
|  |              | Last Test | 17 | 110,88 | 14,77 |          |       |
| <b>Heart Beat<br/>(beat/min)</b>                           | Experimental | Pre Test  | 17 | 88,41  | 12,39 | 5,467**  | 21,21 |
|  |              | Last Test | 17 | 69,65  | 5,61  |          |       |
|  | Control      | Pre Test  | 17 | 81,59  | 9,88  | 3,797**  | 7,45  |
|  |              | Last Test | 17 | 70,65  | 6,60  |          |       |
|  |              | Pre Test  | 17 | 0,69   | 0,16  |          |       |
| <b>Percent Body Fat<br/>(%)</b>                            | Experimental | Last Test | 17 | 4,32   | 1,05  | 5,430    | 38,88 |
|  |              | Pre Test  | 17 | 2,64   | 0,72  |          |       |
|  | Control      | Last Test | 17 | 3,58   | 1,12  | 2,071**  | 11,73 |
|  |              | Pre Test  | 17 | 3,16   | 0,70  |          |       |
| <b>10 x 5 m.<br/>(min)</b>                                 | Experimental | Last Test | 17 | 20,29  | 1,66  | 1,759    | 4,43  |
|  |              | Pre Test  | 17 | 19,39  | 1,29  |          |       |
|  | Control      | Last Test | 17 | 17,62  | 0,69  | -4,848** | 9,93  |
|  |              | Pre Test  | 17 | 19,37  | 1,32  |          |       |
| <b>30 m. Sprint<br/>(msn)</b>                              | Experimental | Last Test | 17 | 5,19   | 0,48  | -4,430** | 18,68 |
|  |              | Pre Test  | 17 | 6,16   | 0,76  |          |       |
|  | Control      | Last Test | 17 | 5,12   | 0,69  | -4,190** | 20,31 |
|  |              | Pre Test  | 17 | 6,16   | 0,76  |          |       |
| <b>Right Hand<br/>Reaction Time To<br/>Sound<br/>(msn)</b> | Experimental | Last Test | 17 | 242,35 | 63,01 | 0,273    | 13,37 |
|  |              | Pre Test  | 17 | 209,94 | 43,03 |          |       |
|  | Control      | Last Test | 17 | 215,00 | 77,07 | -0,590   | 18,82 |
|  |              | Pre Test  | 17 | 255,47 | 49,56 |          |       |
| <b>Left Hand Reaction<br/>Time To Sound<br/>(msn)</b>      | Experimental | Last Test | 17 | 209,71 | 34,55 | -2,062*  | 6,90  |
|  |              | Pre Test  | 17 | 224,18 | 47,17 |          |       |
|  | Control      | Last Test | 17 | 194,94 | 48,87 | -2,726*  | 31,38 |
|  |              | Pre Test  | 17 | 256,12 | 50,38 |          |       |
| <b>Right Hand<br/>Reaction Time To<br/>Light(msn)</b>      | Experimental | Last Test | 17 | 219,71 | 42,40 | -2,622*  | 16,78 |
|  |              | Pre Test  | 17 | 256,59 | 39,57 |          |       |
|  | Control      | Last Test | 17 | 214,71 | 23,38 | -3,903** | 25,01 |
|  |              | Pre Test  | 17 | 268,41 | 51,69 |          |       |
| <b>Left Hand Reaction<br/>Time To Light<br/>(msn)</b>      | Experimental | Last Test | 17 | 227,71 | 37,54 | -2,405*  | 15,88 |
|  |              | Pre Test  | 17 | 263,88 | 49,38 |          |       |
|  | Control      | Last Test | 17 | 211,06 | 17,16 | -2,511*  | 18,67 |
|  |              | Pre Test  | 17 | 250,47 | 62,39 |          |       |
| <b>Leg Strength<br/>(kg)</b>                               | Experimental | Last Test | 17 | 49,38  | 16,02 | 2,254*   | 7,85  |
|  |              | Pre Test  | 17 | 45,50  | 19,71 |          |       |
|  | Control      | Last Test | 17 | 57,88  | 17,00 | 3,607**  | 21,38 |
|  |              | Pre Test  | 17 | 45,50  | 19,11 |          |       |
| <b>Bent Arm Hang<br/>(min)</b>                             | Experimental | Last Test | 17 | 38,60  | 17,93 | 3,842**  | 15,18 |
|  |              | Pre Test  | 17 | 32,74  | 11,52 |          |       |
|  | Control      | Last Test | 17 | 39,96  | 19,23 | 3,946**  | 18,29 |
|  |              | Pre Test  | 17 | 32,65  | 11,23 |          |       |
| <b>Sit-up<br/>(number)</b>                                 | Experimental | Last Test | 17 | 31,94  | 8,75  | 8,046**  | 24,48 |
|  |              | Pre Test  | 17 | 24,12  | 2,62  |          |       |
|  | Control      | Last Test | 17 | 42,18  | 7,74  | 14,137** | 43,10 |
|  |              | Pre Test  | 17 | 24,00  | 2,76  |          |       |
| <b>Push-up<br/>(number)</b>                                | Experimental | Last Test | 17 | 32,82  | 7,02  | 8,179**  | 20,96 |
|  |              | Pre Test  | 17 | 25,94  | 7,15  |          |       |
|  | Control      | Last Test | 17 | 35,47  | 10,52 | 6,014**  | 31,18 |
|  |              | Pre Test  | 17 | 24,41  | 6,53  |          |       |
| <b>Right Hand Grip<br/>Strength<br/>(kg)</b>               | Experimental | Last Test | 17 | 21,81  | 4,65  | 0,881    | 7,38  |
|  |              | Pre Test  | 17 | 20,20  | 5,94  |          |       |
|  | Control      | Last Test | 17 | 22,56  | 5,53  | 1,403    | 11,43 |
|  |              | Pre Test  | 17 | 19,98  | 5,19  |          |       |
| <b>Left Hand Grip<br/>Strength<br/>(kg)</b>                | Experimental | Last Test | 17 | 21,65  | 5,05  | 1,492    | 11,40 |
|  |              | Pre Test  | 17 | 19,18  | 4,62  |          |       |
|  | Control      | Last Test | 17 | 22,64  | 6,33  |          |       |



|  |              |           |    |        |       |         |       |
|--|--------------|-----------|----|--------|-------|---------|-------|
|  |              | Pre Test  | 17 | 19,21  | 4,47  | 1,825   | 15,15 |
| <b>Standing Long Jump Test (cm)</b>        | Experimental | Last Test | 17 | 200,00 | 20,38 | 2,424*  | 10,19 |
|  |              | Pre Test  | 17 | 179,62 | 28,06 |         |       |
|  | Control      | Last Test | 17 | 213,70 | 17,60 | 4,257** | 15,95 |
|  |              | Pre Test  | 17 | 179,61 | 27,93 |         |       |
| <b>Flamingo Balance Test (sec)</b>         | Experimental | Last Test | 17 | 13,24  | 7,81  | 0,231   | 4,90  |
|  |              | Pre Test  | 17 | 12,59  | 8,54  |         |       |
|  | Control      | Last Test | 17 | 18,47  | 13,39 | 1,448   | 29,61 |
|  |              | Pre Test  | 17 | 13,00  | 7,97  |         |       |
| <b>Sit And Reach Flexibility Test (cm)</b> | Experimental | Last Test | 17 | 18,12  | 4,51  | 1,312   | 14,62 |
|  |              | Pre Test  | 17 | 15,47  | 6,99  |         |       |
|  | Control      | Last Test | 17 | 19,47  | 6,10  | 2,219*  | 23,26 |
|  |              | Pre Test  | 17 | 14,94  | 5,79  |         |       |
| <b>Aerobic Power (ml.kg/min)</b>           | Experimental | Last Test | 17 | 67,21  | 8,90  | 5,628** | 6,33  |
|  |              | Pre Test  | 17 | 62,95  | 10,95 |         |       |
|  | Control      | Last Test | 17 | 73,03  | 8,08  | 8,204** | 15,02 |
|  |              | Pre Test  | 17 | 62,06  | 10,24 |         |       |
| <b>Anaerobic Power (kg.m/min)</b>          | Experimental | Last Test | 17 | 71,32  | 12,49 | 4,082** | 8,41  |
|  |              | Pre Test  | 17 | 65,32  | 17,13 |         |       |
|  | Control      | Last Test | 17 | 74,60  | 15,10 | 3,295** | 12,89 |
|  |              | Pre Test  | 17 | 65,34  | 17,14 |         |       |

\*\*p&lt;0.01 \*p&lt;0.05

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## DETERMINING SOME PHYSICAL PARAMETERS OF SOCCER AND IN DOOR SOCCER PLAYERS

Pepe Osman<sup>1</sup>, Günay Erkan<sup>1</sup>, Çoksevrim Bekir<sup>1</sup>, Sucan Serdar<sup>1</sup> Polat Metin<sup>1</sup>

<sup>1</sup>Physical Education And Sport College Of Erciyes University, TURKEY

Email: ossy\_pasha@hotmail.com / 07.02.2010 / 14.02.2010

### Abstract

**The purpose.** At this study, it was aimed to determine some physical parameters of in door soccer and soccer players.