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Comparison of the Motoric Features of 10-12 Years Age Female Volleyball Players with Their Technical Capacities

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Abstract

Objectives: The target of this study is the determination of the effect of 8 week strength exercise upon the technical and the motoric capacities of 11-12 years of age female players and elucidates the correlation between the technical and the motoric features if these are any.

Design: This study was conducted by 36 female volleyball players who played volleyball actively in school and club competitions in 2011-2012 seasons on voluntary basis. The participants were separated as 18 member experimental group with an average age of 11.6±0.5 years, an average height of 163.5±9.6 cm, an average body length of 53.5±8.8 kg and an average experience of 18.1±5.1 months and a 18 member control with an average age of 11.6±0.5 years, an average length of 163.8±6.8 cm, an average body weight of 54.0±5.07 kg and an average experience of 18.0±10.0 months.

Methods: The motoric features were measured by the shuttle moves, push-ups, vertical and long jumps from the static situation and the technical capacities were found by the systems measuring the accuracy of the finger passes, digging passes and serves. After the determination of the initial values, the experimental group was subjected to a 1 hour fifteen minutes a day, three days a week 8 week strength exercise.

Results: There was a statistically significant increase between all the motoric and technical capacities of the experimental group after eight week power program ($p<0.05$). However there was not a statistically significant change in the control group ($p>0.05$). There was a statistically significant correlation between the pre and post test evaluation of the motoric and the technical features of the experimental group ($p<0.05$). However there was no statistically significant difference between the values of the control group ($p>0.05$).

Conclusion: The experimental group in this study which was subjected to both technical and strength program showed statistically significant improvements in both their technical and motoric capacities.

Keywords: Mini Volleyball, Motoric, Technique, Vertical Jump.

Introduction

As well as being one of the most popular sports of Turkey, volleyball contains highest number of licensed female players compared to other sports**.** Volleyball is a sport which requires highest degree of motoric features (Marqeues et al., 2004; Borras et al., 2011). It is an activity which requires utmost level of anaerobic power, together with jumping and swiftness and the combination of technical movements in a very rapid manner (Fontani et al., 2005). The success of the new starters in the basic movements such as finger pass, digging pass and serves is highly dependent on the power of their fingers, arms and the legs. Apart from that the basic movements, volleyball require the proper use of strength, speed and the coordination. In other words although the techniques specific to volleyball differ as in all sports, the motoric features are the most important factors in the development and the application of these techniques (Borras et al., 2011). The determination of the motoric capacities of the new starters is of great importance for the sporting level they can reach (Hakkinen, 1989)**.** The targets of this study is the determination of the effect of 8 week strength exercise upon the technical and the motoric capacities of 11-12 years of age female players and elucidate the correlation between the technical and the motoric features if these is any.

Volleyball is a sport which has the child gain the virtue of the habit of life-long physical activity and help to develop his/her muscle strength, endurance, flexibility, coordination and the agility (Çelenk, 2009). Since volleyball requires the muscle type known as the elongated muscle, the shape bodies of the players develop accordingly. Ultimately the body takes the ideal shape (neither without muscles nor with extensive muscles). Their body shapes were neither very thin nor very thick. For instance the volleyball players cannot have the body shape known as the "*the zero size*". The body strength of the volleyball players increases as their bodies get thicker. Because as the body gets thicker the skeleton system of the body cannot lift it properly that is why the volleyball players must maintain some very delicate balances. The body development of the volleyball players are not as that of football or basketball players which requires man to man struggle. Since volleyball makes the use of whole parts of the body possible the body develops in a balanced manner. Since it requires of many movements both on ground and in air the body mass develops in a very ideal way. That is why the models which have an athletic background mainly come from the volleyball players**.** The modern volleyball, which passed through so many changes throughout its

history, is a sport which demands well balanced motoric features and mental coordination (Kenny and Gregory, 2006; Günay, 2005)**.** The distribution of the motor features in volleyball is given as power 45%, endurance 10%, speed 15% and flexibility and coordination 30% (Gündüz, 1995)**.**

Methods

The features of the participating groups

The control group was consisted of 18 female players in the mini volleyball team of Gazi University Sport Club with an average age of 11.6 ± 0.5 years and the experimental group was 18 female volleyball players chosen from the mini volleyball team of İller banks sport club with average age of 11.6 ± 0.5 years. The participants and their trainers were briefed about the study in order to increase their motivations.

Data collection

After completing the pre-test measurements of the both groups the experimental group was subjected to a 1 hour 15 minutes a day, tree day's week 8- week strength training program to improve their motoric capacities. The control group at the other hand continued their normal volleyball techniques training during this period. The programs applied to the experimental group were based upon the related literature and the determinations of the motoric features were relied by the use of three different test systems. The literature surveys revealed that there were no study related to the determination of the technical skills of the mini volleyball players and there were three test systems established after consulting the experts in the area.

Data collection tool

There was an "*athlete personal and performance information card* ", prepared for each participant which contains the section for the personal information (name and surname, age and sporting experience), physical features (height and body weight), motoric measurements (vertical jump, long jump from the static position, 30 seconds push –ups and 20 seconds shuttle moves (Sevim, 2010; Zorba and Saygın, 2009) and the information about the test systems mentioned above.

The motoric test measurements of the players

Vertical jump test

The vertical jump test is determines the maximum jumping height by both feet in front of the platform mounted upon the wall. The normal arm each of the player who was going to be tested was determined in front of the platform and the difference between the jumping

height and the arm reach was taken as the vertical jump length, The test was repeated in duplicate and the best results were recorded (Ellis et al., 2000).

Long jump from the static position

The participants tried to jump the highest distance away from a line marked on the floor with both feet. The distance between the starting line and the mark which the participant left on the floor nearest to the starting line is recorded in centimeters (cm).

Shuttle move

The participants carried out a shuttle moves for 30 seconds. They lay out on their backs with their knees were folded 30 cm from the hip and the hands were bonded at the neck tries to get from the laying downward position to the sitting position. The number of shuttle moves was recorded for each participant in a specified time (Zorba and Saygın, 2009)

Push-up

The participants were asked to make push-ups in 20 seconds. They lay down facing the floor the hands were placed at the level of the shoulders keeping thumps in the same when the body was in fully stretched position and tries to lift the body as many times as possible within a specified time. The number of push-ups in 20 s was recorded (Sevim, 2010).

Technical test of the participants

Finger passes to the target on the wall:

A circle with a radius of 25 cm is placed at the middle of a rectangular with the dimensions of 1.50 x 1.20 cm placed at height of 2.05 m from floor which is the height of the mini volleyball net. The participants were required to hit the target using a finger pass technique 50 away from the wall for 30 s recording to the number of shoots on the target by the use of the proper technique.

The digging passes at the target on the wall.

Using the same target for the finger pass the participants were asked to hit the target with digging pass 1 m away from the wall for 30 s. The number of passes on target with the use of a proper technique is recorded.

Downward serves to the pre-determined regions

The mini volleyball court is divided into four regions and each player is asked to send five services to each region by the use of downward technique. Each proper serves on the target is counted.

Analyses of the data

The comparison of the pre and post-test data of the technical and the motoric capacities of the experimental and the control groups were carried Wilcoxon Signed Rank test used for the comparison of the dependent non-parametric groups. The comparison of the pre-test and post-test data of the technical and the motoric tests of the experimental and the control groups were realized by the use independent groups. Also the correlation analysis of the technical and the motoric features of the experimental and the control groups were carried out employing the of the Spearman Rank Order correlation test of the Sigma Plot 11.0 statistical (Systat Software Inc, USA) software. The significance level was taken as $p<0.05$ for all statistical analyses.

Results

There was a statistically significant increase in the motoric features of the experimental group after 8 week training program (*p<0.05*).

Table 1. The demographic features of the experimental and the control group.

Parameters	**Experimental group (n=18)**	**Control group (n=18)**	***p***
Age (years)	11.6 ± 0.5	11.6 ± 0.5	0.985
Height (cm)	163.5 ± 9.6	163.8 ± 6.8	0.921
Body weight (kg)	53.5 ± 8.8	54.0 ± 5.7	0.864

Table 2. The motoric features of the experimental group before and after the training period (n=18).

Parameters	**Pre-test**	**Post-test**	*p*
Shuttle (times)	2.0 ± 2.3	3.6 ± 3.7	<0.001*
Push-ups (times)	10.1 ± 3.3	16.0 ± 4.9	<0.001*
vertical jump(cm)	28.7 ± 5.2	32.1 ± 5.3	<0.001*
Long jump (cm)	145.7 ± 21.5	153.9 ± 23.1	<0.001*

(Statistically significant difference, *p<0.05*).

There was not a statistically significant difference between the pre and post results of the control group after the application of 8 week technical program (*p>0.05*).

Table 3. The motoric feature so the control group (n=18)

Parameters	**Pre -test**	**Post-test**	*p*
Push-ups (times)	3.1 ± 2.1	3.7 ± 1.8	0.094
Shuttle (times)	12.6 ± 4.2	13.9 ± 4.9	0.064
vertical jump(cm)	29.2 ± 6.9	28.9 ± 6.3	0.641
Long-jump (cm)	147.3 ± 14.9	147.5 ± 15.0	0.786

(There is no statistically significant difference, *p>0.05*).

There was a statistically significant increase in all the technical capacity features of the experimental group after an 8 week strength exercise ($p<0.05$).

Table 4. The technical features of the experimental group (n=18)

Parameters	**Pre-test**	**Post-test**	*p*
Finger Pass	26.1 ± 7.1	30.7 ± 7.6	<0.001*
Digging Pass	8.9 ± 5.5	13.7 ± 5.3	<0.001*
Service	2.5 ± 0.9	4.1 ± 0.7	0.029*

(There is no statistically significant difference, *p<0.05*).

There was not a statistically significant difference in the technical capacity features of the control group after an 8 week strength exercise ($p>0.05$).

Table 5. The technical capacity features of the control group (n=18)

	Pre-test	**Post-test**	*p*
Finger pass	29.6 ± 3.6	30.7 ± 7.6	0.946
Digging Pas	15.2 ± 4.5	15.5 ± 4.5	0.438
Service	3.2 ± 0.9	3.3 ± 0.7	0.646

(There is not a statistically significant difference, $p>0.05$)

Table 6. The correlation between the pre-test results of the motoric and the technical capacity features of the control group.

	Finger pass		**Digging pass**		**Ser and s**	
Parameters	**Correlation coefficient**	***p***	**Correlation coefficient**	***p***	**Correlation coefficient**	***p***
Push-ups (times)	0.121	0.0121	0.0228	0.928	0.188	0.460
Shuttles (times)	0.0235	0.921	0.0593	0.817	0.319	0.207
Vertical J. (cm)	0.110	0.666	0.285	0.262	-0.117	0.646
Long jump	0.0197	0.936	0.189	0.460	0.137	0.592

There was not a statistically significant difference between pre-test results of the motoric and technical skills.

Table 7. The comparison of the post test results of the historic and technical capacities of the control group.

Parameters	**Finger pass**		**Digging pass**		**Ser and s**	
	Corr.	***p***	**Corr.**	***p***	**Corr.**	***p***
Push-ups (times)	0.233	0.361	0.250	0.326	0.455	0.854
Shuttles (times)	0.0751	0.766	0.363	0.148	0.347	0.166
Vertical jump (cm)	0.0179	0.943	0.217	0.393	0.182	0.478
Long jump (cm)	0.170	0.509	0.534	0.266	-0.191	0.454

When we look at the post test results of the motoric and technical capacity values of the control group we observe no relations between them.

Table 8. The comparison of the pre-test results of the historic and technical capacities of the control group.

Parameters	Finger pass		Digging pass		Ser and s	
	Corr.	***p***	**Corr.**	***p***	**Corr.**	***p***
Push-ups (times)	0.0942	0.705	0.361	0.138	0.651	0.113
Shuttles (times)	0.108	0.662	-0.140	0.574	0.566	0.141
vertical jump (cm)	0.328	0.181	0.283	0.252	0.690	0.135
Long jump (cm)	-0.192	0.436	-0.263	0.285	0.288	0.241

There was not any statistically significant correlation between the technical capacities and the motoric features between the post test results of the control group and experimental group.

Table 9. The post test results of the technical capacities and the motoric feature of the control group**.**

Parameters	Finger pass		Digging pass		Service	
	Corr.	***p***	**Corr.**	***p***	**Corr.**	***p***
Push-ups (times)	0.269	0.274	0.503	0.053	0.570	0.133
Shuttles (times)	0.328	0.178	0.413	0.856	0.509	0.306
Vertical jump (cm)	0.364	0.134	0.171	0.492	0.501	0.338
Long jump (cm)	-0.302	0.217	-0.295	0.227	0.0251	0.915

The post test results of the technical capacities and motoric features of the control group revealed no significant correlation between them.

Discussion

The physical compatibility parameter such as height and the body weight of the participants generally showed parallelism with the literature and the small difference observed in this study was attributed to the difference in the sporting branches. Fleck et al. (1985) state that in their study where they investigated the effect of volleyball upon the physical and the physiological development of the girls with an average age of 12.37 ± 1.13 years found that the mean height and weight of the participants were and 155 ± 8.93 cm and 42.58 ± 6.68 kg. Pekel et al. (2006) found that the corresponding values as 148.7 ± 7.8 cm and 35.7 ± 8.0 kg in their study where they evaluated the relation between the physical compatibility test results and the anthropometric features of the sporting girls with an average age of 11.5 ± 0.8 years. Yazarer et al. (2004) reported that the average heights and the body weighs of the girls with an average age of 12.76±1.42 years who attended a two month basketball course as 152.360±9.844 cm and 43.252±9.498 kg respectively. The average age of the experimental

and control groups found that attended this study were in 11.6±0.5 years. The average height of the players was, 163.5±9.6 and 163.8±6.8 cm and their average body weight were 53.5±8.8 and 54.0±5.7 kg. There was a statistically significant increase in the post training values of long jump from a static position of the experimental group which were subjected to a strength exercises in addition to volleyball training. The corresponding values of the control group who were not subjected to any form of additional exercise on the other hand showed no statistical difference and. The pre and post training values of the control group remained almost the same. We can easily conclude that the additional power exercise applied to the experimental group had a synergistic effect upon the vertical and long jump from a static position values. Duncan et al. (2006) who investigated the effect of volleyball upon the physical and physiological features of the female children with an average age of 12.37±1.13 years reported the average long jump from a static position as 134±9.97 cm while Pekel et al. (2006) and found the corresponding value as 170.8±20.8 cm in their study upon 43 three female players with an average age of 11.5±0.8 years. Ayan and Mülazımoğlu (2008) reported that the average value for the long jump from a static position of the female players with an age of 8-10 years after the performance test they carried out to select the skillful players was 94.72±16.83 cm. The pre- and post-test vertical jump values were 28.7±5.2 cm and 32.1±5.3 cm for the experimental and 29.2±6.9 cm and 28.9±6.3 cm for the control group in this study. Melrose et al. (2007) and reported the vertical jump performance of the adolescent female volleyball players as and 35.5 ± 6.2 cm. Ayan and Mülazımoğlu (2008) determined the average vertical jump value for 8-10 years old girls as and 17.27±4.09 cm. Kalkavan et al. (2006) reported that the vertical jump values of 32.83±5.69 and 37.28±5.02 cm for the child and pubertal female basketball players with an average age of 11.08±0.51 and 12.67±0.51 years.

The number of 30 s shuttle exercise pre and post-test values of the volleyball players participated in our study after were found to be and 10.1±3.3 and 16.0±4.9 for the experimental and 12.63±4.21 and 13.92±4.95 for the control group. The number of 30 s shutter exercise showed a statically significant increase of the experimental group who was subjected to an 8 week s exercise in addition to normal volleyball training. On the other hand there was not any increase with statistical importance in the number of 30 s shuttle exercise in the control group who was not subjected any form of strength exercise. Although the pre- test values of the 30 s shuttle test results of the experimental group was lower than the control group the power exercise applied together with the regular training made the post test results

of the experimental group higher than the control group. This result verifies the positive effect of the strength exercises. Melrose et al. (2007) found the 1 minute shuttle values of the adolescent female volleyball players 47.0 ± 6.7. Pekel et al. (2006) as a result of the study they carried out upon 43 female athletes with an average age of 11.5±0.8 found the same value as 33.4±6.4. Öz et al. (2010) in their study which they investigated that the physiologic and bio-motoric features of the female basketball players at the an average age of 14-16 by the use of Euro-fit test system found the average 30 s shuttle move as 20.0±0.53. The differences were attributed the difference between the sporting branches.

Millic et. Al (2012), investigated the bio-motoric condition and the kine-sociologic effect of the volleyball upon 242 female children at the age of 0-12 years reported that 42 of them were regularly attending the volleyball training sessions while the rest were not involved in any sports expect those they do in physical education courses in the school. According to the result of the study the volleyball training session have a positively effect in the development of the muscle mass and the strength of the player. Therefore the children who played volleyball showed a much better performance in the jumping skills which require explosive power than those who were not doing any regular sport. All these data proves that the volleyball training have a positive effect on the physical development of the children which supports the data obtained in our study. Noyes et al. (2005) had 31 female volleyball players with an average age of 14.5 ± 1.0 years subjected to a 6 week training program of three days a week, 90-120 minutes jumping and strength program in order to prevent the crossed knee bond injuries. The participants were subjected to deep jumps, vertical jumps and shuttle moves and the players had 65% increases in their shuttle moves and vertical jumping values at the end of this period. The experimental group in this study which was subjected to both technical and strength program showed statistically significant improvements in both their technical and motoric capacities.

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