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Effect Of Combined Training On Anaerobic Power And Motor Skills Of Korfball And Basketball Players

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Abstract: In this study, the effects of eight-week combined training program on the development of anaerobic power and some isometric forces of korfball and basketball players are examined. 29 male (10 basketball players, 9 korfball players and 10 control group) university students, whose age range is 19-24 years, participated in the study. While basketball and korfball players were included in the training program, the participants in the control group continued their routine daily activities. Mean power (watts), peak power (watts), relative power (kg / watts), vertical jump (cm), right hand and left hand paw force (kg) and leg force (kg) were measured before and after the training program. Eight-week training program (3 days a week) consisted of resistance exercises (60-1RM), plyometric exercises (30 cm, 40 cm and 50 cm safes), common and intensive intervals (60-80% HR max), coordination and technical-tactical exercises. Statistically significant increase are determined in the peak power, relative power, vertical jump and leg force values of the basketball group and vertical jump, right hand, left hand and leg force values of the korfball group ($p<0.05$). In the light of the data obtained, it is seen that the increase in the performance values of basketball players is higher than the korfball players. Anaerobic power and vertical jump in basketball are more dominant than the korfball branch and the game progress is faster than the korfball. These reflect the effects of the training. As a result, it was observed that the combined training program used in this study contributes to improving the performance of basketball players, while different training models should be used for korfball players.

Keywords: Korfball, Basketball, Anaerobic Power, Isometric Force, Training Practices, Motor Skills

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1. INTRODUCTION

The inventor of Korfball is Nico Broekhuysen, who is a Dutch Physical Education teacher, seeing that girls and boys did not play together in physical education lessons, Broekhuysen designed the Korfball game in 1902 and started playing it in his lessons, and inspired by a game he played in Sweden.[1] It was first started in our country in 1995 at Marmara University School of Physical Education and Sports and FMV Private Işık High School.[2] Korfball is a hand-played sport like Netball and basketball. The aim of the game is to make a shot or pass the ball by receding when the defender is in front of him. Korfball is played over two periods of 30 minutes within the framework of the rules set by the international korfball federation. There is a 10-minute break between the periods.[3, 4] The game is played on a pitch equally split into two halves with standard pitches being 20m x 40m. For each team, there is a basket called korf (basket) that is attached to the end of a 3.5-meter-long pole.[5, 6] It is the only team sport played by men and women together without creating any advantage or disadvantage in the gender. A korfball team consists of 4 women and 4 men. While 2 women and 2 men are in defence, 2 women 2 men are in the attack area. Physical contact is not allowed in korfball sport.[7,8] In the face of intense effort, the effectiveness of athletes must be high throughout the competition. Coordinated and effective display of bio-motor properties with each other brings the condition to the fore. In basketball, speed, agility, upper and lower extremity strength, and maximal anaerobic endurance are at the forefront.[9] The strength factor in basketball stands out as the dominant bio-motor in the competition. In many sports, strength stands out as a speed-force component in changing direction, acceleration, jump, sprint performances and there is a relationship between these parameters.[10] The fact that there is a lot of contact with the opponent in basketball, ball control, fast attacks, changes in direction with the ball and the game being faster than korfball cause differences in training approaches. In korfball game, many factors such as male and female athletes fighting together, no restriction in offense time, and defending each other are features that distinguish it from basketball. Rebounding, passing, and tactical approaches are similar to both branches. In addition, players who can maintain a high performance rate during the competition in team sports are advantageous. If an athlete fails in planning in the long-term performance, it may lead to a decrease in performance after a series of high-intensity efforts.[11] In line with this approach, research was carried out to determine the effect of the eight-week combined training period on some bio-motor features of the athletes' active in the korfball and basketball branches.

2. MATERIALS AND METHODS

2.1 Participants

29 male (10 basketball players, 9 korfball players and 10 control group) university students, whose age range is 19-24 years, participated in the study. While basketball and korfball players were included in the training program, the participants in the control group continued their daily routine activities.

Inclusion criteria	Exclusion criteria
Age 18 years and older males	Illness during training
Auropean (qualitative only)	Injury during training
University student	Not attending training
Play on the university team	Failing to perform at maximum in tests
Good general health	
Informed Consent	

2.2 Korfball and Basketball Training Program

The eight-week training program is designed as follows, taking into account the basic components such as technical, tactical and physical condition for korfball training[12], strength, power and quickness for basketball training.[13] The current study is based on previous trainingin tensities involving young people using a periodized model.[14]

Table 1. -Week Training Program Content of Korfball and Basketball Study Groups

	Days					
Weeks		Monday	Tuesday	Wednesday	Thursday	Friday
1. and 2.	Morning	Body weight work out		Body weight work out		Body weight work out
	Midday					
	Evening	A-Technical and Tactical Training			A-Technical and Tactical Training	
3. and 4.	Morning	A-Strength Training		A-Strength Training		A-Strength Training
	Midday		A-Technical and Tactical Training		A-Technical and Tactical Training	
	Evening	Shooting Training		Shooting Training		Shooting Training
5. and 6.	Morning	B-Strength Training		B-Strength Training		B-Strength Training
	Midday		A-Technical and Tactical Training		A-Technical and Tactical Training	
	Evening	Shooting Training		Shooting Training		Shooting Training
7. and 8.	Morning	Plyometric Training		Plyometric Training		Plyometric Training

Midday	B-Technical and Tactical Training	B-Technical and Tactical Training	B-Technical and Tactical Training
Evening	Shooting Training	Shooting Training	

2.2.1 1st and 2nd Weeks training program

2.2.2 ***Body weight work out***

8-force station with his/her own body weights (time, burpees, push-ups, shuttle, reverse shuttle, lunge, air squat, jump rope, plank stance and variation in each station against time) is 15 minutes. General and special warming for 30 minutes, station work for 10 minutes and cooling were carried out. Each station was applied as 5 sets without rest between stations for 30 seconds. 1-2 minutes rest between sets was given (Table 1).

Technical and tactical training (A)

Technical and Tactical working drills for 15 minutes, general and special warming for 40 minutes station exercise and cooling for minutes 10 were carried out. Training drills were applied as 60% widespread interval loadings of the maximum heart rate.

2.2.2 3rd and 4th Weeks training program

Strength training (A)

Classical strength training for lower and upper extremities with eight stations (shoulder press, Lat pull down, bench press, leg press, calf raise, leg curl, biceps curl, push down) 1 maximum repetition (1 MT) kg with 50% 3 sets of 10 repetitions, 30-45 seconds rest between sets and 1-2 minutes rest between stations (Table 1).

Shooting training

Shot training specific to the korfball and basketball branches was applied. It was completed with 15 minutes general and special warm-up, 40 combined shooting drills and 10 minutes cooling in the training content.

Technical and tactical training (A)

Technical and Tactical working drills were applied as 15 minutes general and special warming; 40 minutes station work and 10 minutes cooling. Working drills were applied as 60% widespread interval loadings of the maximum heart rate.

2.2.3 5th and 6th Weeks training program

Strength training (B)

Classical strength training for lower and upper extremities with eight stations (shoulder press, Lat pull down, bench press, leg press, calf raise, leg curl, biceps curl, push down) 1 maximum repetition (1 MT) kg with 50% 3 sets of 10 repetitions, 30-45 seconds rest between sets and 1-2 minutes rest between stations (Table 1).

Shooting training

Shot training specific to the korfball and basketball branches was applied. It was completed with 15 minutes general and special warm-up, 40 combined shooting drills and 10 minutes cooling in the training content.

Technical and tactical training (A)

Technical and Tactical working drills were applied as 15 minutes general and special warming; 40 minutes station work and 10 minutes cooling. Working drills were applied as 60% widespread interval loadings of the maximum heart rate.

2.2.4 7th and 8th Weeks training program

Plyometric and technical and tactical training (B)

3 sets of 25 repeated jumps with double feet were applied on the boxes of 30-40-50 centimetres. Afterwards, technical and tactical drills continued. Technical and Tactical working drills were made as 15 minutes general and special warming, 40 minutes station work and 10 minutes cooling. Working drills were applied as 70-80% of the maximum heart rate as widespread interval loadings (Table 1).

Shooting training

Shot training for shooting the ball specific to the korfball and basketball branches was applied. It was completed with 15 minutes general and special warm-up, 40 combined shooting drills and 10 minutes cooling in the training content.

2.3 Data Collection Tools

Mean power (watts), peak power (watts), relative power (kg / watts), vertical jump (cm), right hand and left hand paw force (kg) and leg force (kg) were measured before and after the training program. Anaerobic power 30 sec was evaluated with Wattbike Pro cycle ergometer (Wattbike Pro, Nottingham, UK), vertical jump was evaluated with Jump meter (TKK 5406 Takei, Japan) and right hand and left hand claw force and isometric leg force were evaluated with digital dynamometer (Takei A5401-5402). For each subject, the air resistance unit (resistance corresponding to 0.75 of their own body weight) and magnetic resistance settings were applied to the body weight obtained before the start of the pre-test. After visual stimulation from the wattbike anaerobic power bike appears on the screen, the athletes started the test from the wattbike anaerobic power bike within 5 seconds.[15] Power peak 6 seconds and 30 seconds performance results were recorded. Vertical jump, leg and right-left hand claw force values of the participants were taken 3 times and recorded on the test form.

3. STATISTICAL ANALYSIS

Paired Samples Test was used for the pre-test and post-test changes of the groups. In comparisons between groups, group comparisons were made on the differences obtained by calculating the pre-test and post-test changes of the groups. One way variance analysis (one-way ANOVA) was used for this. Tukey tests were used for post hoc comparisons in variance analysis. Mean and standard deviation (mean ± SD) were used as descriptive statistics. Significance level was determined as $p \leq 0.05$. SPSS 20 package program was used for analysis.

4. RESULTS

Table 2. Demographic Characteristics			
Group	**Age (year)**	**Height (cm)**	**Weight (kg)**
Basketball n=10	21.20 ± 2.04	194.60 ± 7.15	102.28 ±13.69
Korfball n=9	21.67 ± 1.00	180.56 ± 8.99	81.79 ± 12.86
Control n=10	20.00 ± 1.15	186.50 ± 7.20	83.25 ± 9.39
Total N=29	20.93 ± 1.60	187.45 ± 9.49	89.36 ± 15.07

Values are mean ± SD

According to the table, the mean age of the participants in the basketball group is 21.20 ± 2.04, height mean is 194.60 ± 7.15, weight mean is 102.28 ±13.69, the mean age of the korfball group is 21.67 ± 1.00, height mean is 180.56 ± 8.99 and weight mean 81.79 ± 12.86, control group mean age 20.00 ± 1.15, height mean 186.50 ± 7.20 and weight mean 83.25 ± 9.39 (Table 2).

Table 3. Comparison of Pre-test and Post-test Changes in Basketball Players					
		Mean ± SD	**t**	**df**	**p**
Body mass (kg)	pre	102.28 ± 13.69	1.113	9	0.30
	post	101.20 ± 13.89			
Power Mean (W)	pre	609.30 ± 102.30	-1.785	9	0.11
	post	638.70 ± 91.10			
Power Peak (W)	pre	988.60 ± 154.80	-2.437	9	**0.04***
	post	1061.30 ± 147.06			
Power Mass (kg/W)	pre	5.96 ± 0.63	-2.217	9	**0.05***
	post	6.35 ± 0.85			
Jump (cm)	pre	37.83 ± 3.71	-7.387	9	**0.00***
	post	41.79 ± 3.11			
Right Hand (kg)	pre	50.67 ± 6.84	-.303	9	0.77
	post	51.14 ± 7.96			
Left Hand (kg)	pre	47.22 ± 6.58	-1.124	9	0.30
	post	48.74 ± 6.22			
Leg force (kg)	pre	171.50 ±17.88	-4.597	9	**0.00***
	post	200.84 ±18.11			

Values are mean ± SD, *p<0.05 when compared with pre-test

As a result of the analysis, the power peak, power mass, jump and leg force of the basketball group changed statistically from pre-test to post-test, t (9) = - 2.437, p <0.05 for power peak, t (9) = - for power mass 2.217, p <0.05, t (9) = - 7.387 for jumping, p <0.05, t (9) = -4.597, p <0.05) for leg force. The changes are in an increasing direction (Table 3).

Table 4. Comparison of Pre-test and Post-test Changes in Korfball Players					
		Mean ± SD	**t**	**df**	**p**
Body mass (kg)	pre	81.79 ± 12.86	-.583	8	0.58
	post	82.47 ± 12.89			
Power Mean (W)	pre	643.56 ± 84.25	.245	8	0.81
	post	639.33 ±107.68			
Power Peak (W)	pre	973.44 ± 91.91	-1.341	8	0.22
	post	1022.67 ± 155.56			
Power Mass (kg/W)	pre	7.89 ± 0.72	1.063	8	0.32
	post	7.50 ± 0.67			
Jump (cm)	pre	38.76 ± 5.94	-6.646	8	**0.00***
	post	40.74 ± 6.13			
Right Hand (kg)	pre	47.18 ± 4.10	-4.913	8	**0.00***
	post	50.52 ± 5.11			
Left Hand (kg)	pre	42.84 ± 5.57	-4.728	8	**0.00***
	post	45.98 ± 5.43			
Leg force (kg)	pre	168.67 ± 38.45	-8.143	8	**0.00***
	post	180.11 ± 37.28			

Values are mean ± SD, *p <0.05 when compared with pre-test

As a result of the analysis, the jump of the korfball group changed statistically significantly from the pre-test to the post-test from the right hand, left hand and leg, t (8) = - 6.646, p <0.05 for the jump, t (8) = - 4.913 for the right hand. , p <0.05, t (8) = -4.728 for the left hand, p <0.05, t (8) = - 8.143, p <0.05 for the leg force. The changes are in an increasing direction (Table 4).

Table 5. Comparison of Pre-test and Post-test Changes in Control Players

		Mean ± SD	t	df	p
Body mass (kg)	pre	83.25 ± 9.39	-1.054	9	0.32
	post	83.82 ± 9.55			
Power Mean (W)	pre	577.80 ± 47.42	-.757	9	0.47
	post	586.90 ± 50.93			
Power Peak (W)	pre	989.80 ± 122.04	.606	9	0.56
	post	970.70 ±75.95			
Power Mass (kg/W)	pre	6.97 ± 0.48	-.527	9	0.61
	post	7.04 ± 0.54			
Jump (cm)	pre	33.52 ± 3.81	-2.103	9	0.07
	post	34.61 ± 3.64			
Right Hand (kg)	pre	43.62 ± 4.49	-8.059	9	**0.00***
	post	46.04 ± 4.61			
Left Hand (kg)	pre	40.97 ± 4.05	-3.564	9	**0.01***
	post	42.47 ± 3.38			
Leg force (kg)	pre	133.50 ± 15.28	-9.125	9	**0.00***
	post	139.10 ± 16.20			

Values are mean ± SD, *p<0.05 when compared with pre-test

As a result of the analysis, the right hand, left hand and leg force of the control group changed statistically from pre-test to post-test; t (9) = - 8.059, p <0.05 for right hand, t (9) = -3.564, p <0.05 for left hand, t (9) = - 9.125, p <0.05 for leg force. The changes are in an increasing direction (Table 5).

Table 6. Comparison of Pre-test and Post-test Changes in Between Groups

		Sum of Squares	df	Mean Square	F	p
Body Mass (kg)	Between Groups	19.01	2	9.506	1.186	0.32
	Within Groups	208.33	26	8.013		
	Total	227.35	28			
Power Mean (W)	Between Groups	5480.11	2	2740.055	1.212	0.31
	Within Groups	58792.86	26	2261.264		
	Total	64272.97	28			
Power Peak (W)	Between Groups	45256.75	2	22628.377	2.208	0.13
	Within Groups	266486.56	26	10249.483		
	Total	311743.31	28			
Power Mass (kg/W)	Between Groups	2.93	2	1.465	2.681	0.09
	Within Groups	14.21	26	.546		
	Total	17.13	28			
Jump (cm)	Between Groups	42.97	2	21.484	9.890	**0.00***
	Within Groups	56.48	26	2.172		
	Total	99.45	28			
Right Hand (kg)	Between Groups	41.41	2	20.703	2.084	0.14
	Within Groups	258.24	26	9.932		
	Total	299.65	28			
Left Hand (kg)	Between Groups	16.36	2	8.179	1.002	0.38
	Within Groups	212.14	26	8.159		
	Total	228.49	28			
Leg force (kg)	Between Groups	3043.29	2	1521.647	10.298	**0.00***
	Within Groups	3841.63	26	147.755		
	Total	6884.92	28			

p<0.05 when compared pre-test and post-test changes in the groups

As a result of the analysis, a statistically significant difference was found between the groups in terms of jump and leg force, F (2.28) = 9.890, p <0.05 for jump, F (2.28) = 10.298, p <0.05 for leg force. There was no significant difference between the groups in terms of other variables (p> 0.05). This means that the significant changes in the groups from the pre-test to the post-test were similar. Post hoc analysis showed that this difference in the jumping was between the

basketball and the korfball group ($p < 0.05$) and between the basketball and the control group ($p < 0.05$). Accordingly, the change in jump height was higher in the basketball group than in the korfball and control group. There was no significant difference between the korfball and the control group in terms of changes in jump height ($p > 0.05$). Post hoc analysis showed that this difference in leg force was between the basketball and the korfball group ($p < 0.05$) and between the basketball and the control group ($p < 0.05$). Accordingly, the change in leg force was higher in the basketball group than in the korfball and control group. There was no significant difference between the korfball and the control group in terms of leg force changes ($p > 0.05$).

5. DISCUSSION

In our research, we tried to determine a common training method that we think will improve some performance indicators for korfball and basketball players due to similar performance demands. The eight-week training program was a complex training program that included weight training, plyometric training, technique-tactics and shooting. At the end of the process, while peak power, relative power, jump and leg strength improved significantly in the basketball group, the right hand, left hand, jump and leg strength improved in the korfball group. Jump performance and improvement in leg strength in the basketball group were higher than in the korfball and control groups. These findings showed that this combined training is effective in korfball players and especially basketball players. Despite the existence of study results showing that there is no significant difference in power development between complex and non-complex training groups[16,17], the combination of plyometric training and weight training is beneficial for improving athletic power and is very popular today. [18,19] For example, complex training combining full-body or lower-body strength/power exercises with jumps has been shown to improve power performance[20]. As a chronic training stimulus, an increase in medicine ball throwing power, superior acute jump performance, and an improved vertical jump performance have been reported to be equally effective and, in some cases, superior to complex training.[19] This literature information explains the developments in both groups. The strength developments in the control group can be explained by the physical and physiological developments in this age group. In many studies, although the physical and physiological characteristics of all people between the ages of 18-30 or 20-30 are stated whether they do sports or not, there is no information on how this age period progresses in.[21] However, both men and women show impressive increases in muscle strength from childhood to adolescence, and their strength growth curves parallel those in body weight and muscle mass growth. After puberty, boys continue to make significant annual gains, largely due to differences in muscle mass and muscle strength.[22] For power development, special training programs such as plyometrics are needed and power is built on sufficient muscle strength.[23] For example, the jump squat is one of many exercises to develop explosive power, and the load used during training is an important factor influencing training results.[24] In an early study , the anaerobic results of complex training consisting of a combination of resistance training and plyometrics for 12 weeks and plyometric training in pre- and early pubertal boys were done which showed that 12 weeks of complex training produced increases in peak and mean power, dynamic strength, and basketball chest pass, vertical jump, and 40-meter sprint performance in pre-teen and early-adolescent boys. [25] Although studies on korfball have shown that korfball has an effect in improving some health and skill-related fitness components, it still appears to fall short of a number of performance indicators when compared to basketball or netball. For example, it has been shown that university students who start korfball have improvements in speed, endurance and power capacity, but the explosive leg strength of female basketball players is higher than that of female korfball players.[26] Similarly, in a study on physical fitness components among basketball and korfball girls' players, higher strength was found in basketball girls' players than in girls' korfball players. Korfball girls' players had better flexibility compared to basketball girls' players.[27] In a study, it was seen that netball players have more quickness and explosive power than korfball players. The authors pointed out that playing netball is just like playing basketball, and that quick reflex, coordination, quickness, explosive power and technique are of great importance. For this reason, they emphasized the importance of physical conditioning training in order to improve motor qualities such as speed, quickness, explosive strength and endurance in netball and korfball players.[28] Undoubtedly, improvements have been recorded in some performance indicators of korfball players in studies evaluating the effects of training. For example, there was significant effect on subjects of long range shoot, penalty shoot and running shoot ability in korfball after six weeks training programme.[29] In another study on korfball players that the strength development for the lower extremity was better than the upper extremity as a result of the strength training practice for the upper and lower extremity.[30] As it can be understood, it is seen that korfball players respond less to the training practices that include a combination of plyometric and resistance exercises in terms of explosive strength performance compared to basketball or netball, because more explosive strength performance is needed in basketball and netball. This supports the results we obtained in our study.

6. CONCLUSION

In our study, at the end of the training practices, there was a significant change in the power mass, peak power, anaerobic power (Power Watt, Peak Power, Power Mass) values of the basketball players within the group and between the groups. At the end of the training practices, there was a significant change in vertical jump values in basketball players and korfball players within the group and between the groups. At the end of the training practices, the development of leg force at the static leg, right and left hand paw values was found significant in the group and between the groups. In the basketball group, development was seen to be more dominant than other groups. Since the game tempo is faster and the jumping activity occurs a lot in the basketball branch during the game, there is a significant increase in jump and anaerobic power values of basketball players compared to korfball players. The present study was limited to 8 weeks, but a training session of at least 12 weeks might assure maximum improvements.

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8. AUTHORS CONTRIBUTION STATEMENT

Dr. Önen M.A. developed the theoretical framework, Dr. Erzeybek M.S., and Dr. Yüksel O. designed and directed the project. Dr. Kaya F. and Dr. Önen M.A. were involved in planning and supervised the work. Dr. Erzeybek M.S., Dr. Yüksel O., and Dr. Kaya F. carried out the experiment. Dr.Erzeybek M.S., and Dr.Yüksel O., designed the model and the computational framework. Dr. Kaya F. and Dr. Önen M.A. processed the experimental data and analysed the data. Dr. Erzeybek M.S., and Dr.Yüksel O., performed the measurements. Dr. Erzeybek M.S, and Dr.Yüksel O. wrote the article. All authors provided critical feedback and helped shape the research, and manuscript. All authors discussed the results and contributed to the final manuscript.

9. CONFLICT OF INTEREST

Conflict of interest declared none.

10. REFERENCES

1. SPORTOVNI.net, Sport: Korfball [Internet]. LepÂąĐ; 2004. [cited 2021 July 20]. Available from: https://www.sportovni.net/korf/historie
2. Güler L. Türkiye'de yeni bir spor dalı: "Korfball". J Phys Educ Sports Stud. 1998;8(20-22):43-7.
3. Crum B. Korfball concepts [Internet]. The Netherlands: KNKV; 2003 [cited 2021 June 28]. Available from: http://korfballadvisor.blogspot.com/2010/
4. Summerfield K, White A. Korfball: A model of egalitarianism? Sociol Sport J. [Internet] 1989 [cited 2021 Sep 5];6(2):144-51. Available from: https://journals.humankinetics.com/view/journals/ssj/6/2/article-p144.xml DOI: 10.1123/ssj.6.2.144
5. International Korfball Federation (I.K.F). Technical Course Level I [notes]. Istanbul, 2004
6. International Korfball Federation (I.K.F). Korfball in the mixed zone. The Netherlands: KNKV, 2006
7. Godinho M, Fragoso I, Vieira F. Morphologic and anthropometric characteristics of high level Dutch korfball players. Percept Mot Skills [Internet] 1996 [cited 2021 July 22];82(1):35-42. Available from: https://pubmed.ncbi.nlm.nih.gov/8668500/ DOI: 10.2466/pms.1996.82.1.35, PMID 8668500.
8. Táborský F. Sportovní hry. Praha: Grada Publishing, ISBN 80-247-0875-2; 2004.
9. Borowski LA, Yard EE, Fields SK, Comstock RD. The epidemiology of US high school basketball injuries, 2005-2007. Am J Sports Med [Internet] 2008 [cited 2021 Aug 12];36(12):2328-35. Available from: https://journals.sagepub.com/doi/10.1177/0363546508322893 DOI: 10.1177/0363546508322893, PMID 18765675
10. Suarez-Arrones L, Gonzalo-Skok O, Carrasquilla I, Asián-Clemente J, Santalla A, Lara-Lopez P, et al. Relationships between change of direction, sprint, jump, and squat power performance. Sports (Basel). 2020;8(3), 38.
11. Rathod LBL. Comparative study of agility among korfball and netball players in Hyderabad, India. In: 2nd Yogyakarta International Seminar on Health, Physical Education, and Sport Science (YISHPESS 2018) and 1st Conference on Interdisciplinary Approach in Sports (CoIS 2018). Atlantis Press. December; 2018
12. Harke Van Der Wall (1991). 1001 Korfball exercises, Translated by Graham Box, International Korfball Federation; 1991 [cited 2021 Aug 20]. 8 p. Available from: http://www.cambskorfball.co.uk/1001_Korfball_Exercises.pdf
13. Ransone, J. Physiologic profile of basketball athletes [Internet]. GSSI: 2017 [cited 2021 September 2]. Available from https://www.gssiweb.org/sports-science-exchange/article/physiologic-profile-of-basketball-athletes
14. Fleck SJ, Kraemer WJ. Designing resistance training programmes, 2nd ed, 199–216. Champaign, IL: Human Kinetics; 2004
15. Herbert P, Sculthorpe N, Baker JS, Grace FM. Validation of a six second cycle test for the determination of peak power output. Research in Sports Medicine. 2015;23(2), 115-125.
16. Ebben WP, Watts PB, Jensen RL, Blackard DO. EMG and kinetic analysis of complex training exercise variables. Journal of Strength and Conditioning Research. 2000;14(4), 451-456
17. Jensen RL, Ebben WP, Blackard DO, McLaughlin BP, Watts PB. Kinetic and electromyographic analysis of combined strength and plyometric training in women basketball players. Medicine and Science in Sport and Exercise. 1999;31(5): S193
18. Ebben WP, Watts PB. A review of combined weight training and plyometric training modes: Complex training. Strength and Conditioning. 1998;20(5), 18-27
19. Ebben WP. Complex training: A brief review. J Sports Sci Med. 2002;1.2: 42
20. Young WB, Jenner A, Griffiths K. Acute enhancement of power performance from heavy load squats. J. Strength Cond. Res. 1998;12(2), 82-84
21. Akgün N. Yaşlılık ve egzersiz, Spor Hekimliği Dergisi. 1998;33:155-62. 3
22. Malina RM, Bouchard C, Bar-Or O. Growth, maturation, and physical activity. 2nd ed. Champaign, IL: Human Kinetics Publishers; 2004.
23. May CA, Daniel C, Kent AL. Power development through complex training for the division I collegiate athlete." Strength & Cond. J. 2010;32.4: 30-43.
24. Marián V, Katarína L, Dávid O, Matúš K, Simon W. Improved maximum strength, vertical jump and sprint performance after 8 weeks of jump squat training with individualized loads. J Sports Sci Med. 2016; 15.3 (2016): 492.
25. Ingle L, Mike S, Keith T. The effect of complex training and detraining programme on selected strength and power variables in early pubertal boys. J Sports Sci. 2007:24(9), 987-999.
26. GuoQing Z. Effects of opening a Korfball course in physical education curriculum on the physical capacities and sports attitude of college students. J Phys Educ. 2009;16 (5),71-4
27. Kaur D. A study on physical fitness components between basketball and korfball girls players of Haryana. International Journal of Physical Education. Sports Health. 2015;2(1):286-7.

28. Rathod LBL. Comparative study of agility among korfball and netball players in Hyderabad India. Advances in Social Science, Education and Humanities Research. 2018; volume 278. 636-637.
29. Hassan W, Rather IA, Pathak M.K. Comparative study on effect of selected exercises on accuracy of long range shoot, penalty shoot and running shoot ability in korfball. International Journal of Physical Education, Sports Health. 2019;6 (5):157-159
30. Shuangtao X. Experimental research on the effect of hit rate of layup by strength training in korfball. In Sports Forum. 2014.