



## The effect of seasonal training program on some physiological parameters among cadet and junior wrestlers

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### Abstract

The purpose of this study is to determine the changes occurring in the height, weight, percentage of body fat, anaerobic power, strength, speed, aerobic capacity, anaerobic capacity and flexibility of cadet and junior wrestlers during the general preparation, special preparation, competitive and off season of training programme and also to determine the effects of this program on these characteristics. This study was conducted on 40 subjects. The subjects were divided into 4 groups; the experimental cadet and the experimental junior groups consisted of 10 wrestlers, control cadet and control junior groups consisted of 10 students. Physical fitness tests, percentage-based changes have been calculated in comparison with the initial data. The comparison of groups was made by multi-variable variance analysis.

In our study, the increases in strength, aerobic capacity, flexibility, anaerobic power an aerobic capacity of wrestlers during the general preparation, special preparation and competition periods were statistically found much more than of the ones who do not exercise regularly ( $p < 0.05$ ). For wrestlers didn't have training during the transition period, their strength, speed, aerobic capacity, flexibility, anaerobic power an capacity decreased and the percentage of body fat and weight increased. For this reason, wrestlers should have active relaxation during the transition period. The same training program has been applied and it has been seen that there is no significant difference between the changes in anaerobic power, flexibility, speed, strength, weight, anaerobic capacity, aerobic capacity and percentage of body fat of junior and cadet wrestlers ( $p > 0.05$ ). There face, it shows us that the some training program can be applied to cadet and junior wrestlers.

In order to follow the improvements in physiological characteristics of wrestlers better, these characteristics should be evaluated before the season, at the end of the general preparation period, special preparation period, the competition period and the transition period when there is insufficiency while improving these characteristics, training programs should be replanned and changed and by this way the insufficiencies of wrestlers should be satisfied before the important competitions.

**Keywords:** Wrestling, Training Program, Physiology, Performance

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## Introduction

Since the sport of wrestling has been happened to be done in competitive ways in recent years, this arouses the necessity of being planned and programmed in preparation training done for competitions. Having only technical capacity and tactical qualification in practice level are not enough adequate to win the competition. Nowadays, the theory of wrestling, methods of training, biomechanics, physiology, assessment and evaluation of wrestling are considered as important factors for wrestlers in their preparation for competition. The changes have been done frequently in the rules of wrestling by International Federation of Wrestling (FILA) cause changes in the methods of training. The adaptation of wrestlers to these renewed changes depends on their adequate preparation period. As a result of this, it is necessary to analyze their energy systems and strengths which they will use in the competition in details and according to these organized training programs of the wrestlers especially in their preparation training (1). Generally, it is stated that developing the 5 main components of physical suitability is obligatory in the preparation stage of the wrestlers. These are the aerobic capacity, strength, endurance, flexibility and body composition (2).

Kunst and Florescu (3) stated that the motor capacity 50%, biometric qualities 10% and psychological factors 40% are effective as the main factors forming the performance in the sport of wrestling. The same researchers pointed out that the motor capacity was formed by 40% endurance, 3% strength and 30% co-ordination ability; the biometric qualities by 35% long arms, 35% rate of height and weight and 30% rate of height and length; the psychological factors by 40% determination, 30% concentration and 30% initiative.

Instead of the researches examining the effects of the 2-3 months training periods, the researches examining the whole year should be done to get more detailed information about the changes in physical properties of the wrestlers. However, changes in the physical properties of the wrestlers occurred in a training year should be investigated and observed with the measurements which were done after the periods of pre-season and general preparation, special preparation, competition and transition instead of being observed with the measurements which were done only before season and after season. Many researchers (4-9) explain that it is necessary to carry out different training programs for cadet and junior wrestlers. However, the wrestling training are done together with cadet and junior categories in the clubs due to the financial difficulties, insufficiency of trainer and foundation and not

having a system for training athletes in our country. Do these changes occur in physiological properties of the cadet and junior wrestlers same or different when the same training program is applied? Our study has an important role in determining the changes in physiological properties of the cadet and junior wrestlers at the general and special preparation, competition and transition periods of a training season.

The purpose of our study is to find out the changes occur in weight, body fat %, strength, aerobic capacity, anaerobic capacity, anaerobic strength and flexibility properties of the cadet and junior wrestlers and determine the effects on these properties at the general preparation, special preparation, competition and transfer periods of the applied training program.

### **Methods**

This research was carried out on the Training group of 20 wrestlers in the Bursa D.S.İ. Nilüfer Sport Club and on the control group of 20 students attending Bursa Cement Factory Industry Profession High School and not playing sports regularly in 1999-2000 season. The groups of training and control were divided into two sub-groups consist of 10 people in each group. They were named as *Experimental cadet*, *Experimental Junior*, *Control Cadet* and *Control Junior* groups. 16-17 year old 10 wrestlers formed the Experimental cadet (the Cadet wrestling team of the club), 18-20 year old 10 wrestlers; the Experimental junior (the junior wrestling team of the club), 16-17 year old 10 students; the control Cadet and 18-20 year old 10 students; the control junior groups. No training program was applied to control Cadet and control junior groups. They only attend the physical education lesson, 2 lesson hour a week (80 minutes).

*The Training Program Applied To Experimental Cadet and Experimental Junior Groups:* Single course training period was done due to training program prepared aiming only a peak (The Championship Of Turkey) within the year. (2, 4, 8-13, 28-31). The annual training program consists of three different periods.

General Preparation Period: 6 trainings a week and 1 training a day were done in this period. In this period, it is aimed to make an infrastructure in order to tolerate the high strength training which should be applied in the periods later. For this reason, the training which has a wide scope were done and by this way the general capacity of the sportsman was increased. The strength of the training which were done in high quantity were increased gradually. General endurance and maximum strength of the conditional quality was intended

to be developed on the first 2 weeks of this period. Extensive, interval and constant commitment methods were applied here. 70% of training were done as physical study (general endurance and maximum strength), 30% of training as technical study. 40%-60 commitment strength was applied. The training lasted 80-90 minutes. At the rest of this period that is 7 weeks the quick strength and special endurance were developed from the conditional properties. New techniques were taught. Physical training and technical study were done at the rate of 50%. Circular training were started to be applied in this period. The strength was increased according to the property of the training. Training did not last more than 80-90 minutes.

Special Preparation Period: 6 training a week and 1 training a day were also done in this period. The main purpose of the special preparation period is to combine the main components of the training in harmony with each other. Although the training of this period was in the appearance of the special training character, the training areas of the general preparation period were continued. Whereas the general scope of the training was being decreased a little, despite the decrease in the rate of general training, the strength of the special and special competition training commitments were increased remarkably. New technical-tactics variations were developed related to the competitions in this period. It was intended to develop strength, speed and endurance peculiar to wrestling. Extensive and intensive commitments, circular training were done in the form of competition. The strength of commitment was increased a little but was decreased one time a three week with fluctuation method. Duration of the training which were done in high strength was decreased. The training were done as 30% physical training, 50% technical-tactics training, 20% special training related to the competition (wrestling). It was intended to carry the strength with the sub-maximum and maximum commitments, speed and endurance to the superiority level in this period.

Competition Period: 6 training a week and 1 training a day were done in the competition period. The main purpose of this period is to develop the competition yield entirely and to preserve it. Special condition level peculiar to wrestling which was begun to be developed in the preparation period, was tried to be raised at a higher level. It was aimed to preserve the reached condition level by the way of the training which is peculiar to competition. As a result of this, while an increase was being ensured in the scope of training which were peculiar to competition, the scope of the general physical and technical training

were increased. Training in the formation of wrestling were increased more in this section. The training were carried out as 20% physical, 30% technical-tactics and 50% similar to competition conditions training. Technical-tactics training, other sport games and stretching activities were done at low strength and scope in the weeks before competition.

Off Period: In many clubs, wrestling training were ceased in the wrestling competition period, that is to say after the end of the last competition. Generally, the transfer period coincides with the summer holiday of the students. Consequently, passive rest (there is no training and physical commitment) was taken in the transfer period.

Many researchers defend the necessity of passing the transfer period with active rest (4, 5, 7, 8, 10, 26, 27). However, Cadet and junior wrestlers spend the transfer period with passive rest due to many reasons in practice. In our study in order to investigate how the weight, body fat percentage, strength, speed, flexibility, aerobic capacity, anaerobic strength and capacity were affected of Cadet and junior wrestlers by passing the transfer period with passive rest, no training was done in the transfer period to the wrestlers and this period was spent with passive rest. This period lasted 8 weeks.

Tests applied in this study: Measurement of height and weight, shuttle run, sargent vertical jumping, hand grip (right and left), back strength, sit and reach, abdominal shuttle (30 sec.), push-up (30 sec.), 40 yard run, body fat % (skinfold fat under skin measurement method) were applied. The formula of Green (32) was used in order to calculate the body fat percentage.  $\text{Body Fat \%} = 3,64 + 0,097$  (biceps, triceps, subscapula, suprailiac, chest and thigh fat thicknesses total).

Statistical Methods: The obtained results from the tests applied before the general and special preparation period, after the special preparation, competition and transfer period were assessed in the SPSS software program. The comparison of the groups were done with multiple variable variance analysis considering synchronicity between the variables of the subjects. The differences among the groups were compared with Bonferroni test which is a multiple comparison test. The comparison was done by explaining the descriptive values of the related measurements of percentage changes among the groups according to the beginning (before general preparation period) (22-25).



Statistical significant was found out among the comparison of the groups at the beginning as seen on the Table 1; Age: experimental cadet-experimental junior and control cadet-control junior ( $p<0.001$ ); height: experimental cadet-experimental junior ( $p<0.05$ ) and control cadet-control junior ( $p<0.001$ ); weight: experimental cadet-experimental junior ( $p<0.01$ ) and control cadet-control junior ( $p<0.05$ ); right hand grip: experimental cadet-experimental junior, control cadet-control junior ( $p<0.001$ ), and experimental cadet-control cadet, experimental junior-control junior ( $p<0.01$ ); left hand grip: experimental cadet-experimental junior, control cadet-control junior ( $p<0.001$ ), experimental cadet-control cadet, experimental junior-control junior ( $p<0.05$ ); back strength: experimental cadet-experimental junior and control cadet-control junior ( $p<0.001$ ); push-up (30 sec.): experimental cadet-control cadet ( $p<0.05$ ); anaerobic strength: experimental cadet-experimental junior ( $p<0.01$ ), control cadet-control junior ( $p<0.05$ ); aerobic capacity, experimental cadet-control cadet and experimental junior-control junior ( $p<0.001$ ); speed: experimental cadet-control cadet ( $p<0.001$ ) and experimental junior-control junior ( $p<0.01$ ); statistical significant was not found out in other comparisons.

**Table 2: Percentage Changes of Height, Weight, Body Fat %, Right and Left Hand Grip**

Variable	Groups	BSPP		ASPP		ACP		AOP	
		x (%)	SS	x (%)	SS	x (%)	SS	x (%)	SS
Height	G1	0,3	0,3	0,9	0,4	1,3	0,3	1,5	0,4
	G2	0,1	0,3	0,6	0,5	0,9	0,3	0,9	0,3
	G3	0,2	0,3	1,1	0,4	1,4	0,4	1,4	0,4
	G4	0,1	0,2	0,7	0,5	1	0,4	1	0,4
	Comparison	G1-G2: ns		G1-G2: ns		G1-G2: ns		G1-G2: *	
Weight	G1	-1,3	1,7	-1,9	2,7	-2,5	2,3	4,1	2,2
	G2	-0,9	1,6	-2,5	1,3	-2,9	1,5	2,6	1,1
	G3	1,2	1,4	4,9	1,5	6,2	1,8	6,8	1,8
	G4	1	1,1	2,8	2,5	3,5	2,3	4	1,9
	Comparison	G1-G2: ns		G1-G2: ns		G1-G2: ns		G1-G2: ns	
Fat %	G1	-1,6	1	-5,9	1	-7,7	0,9	-1,4	1,1
	G2	-1,7	0,8	-5,7	0,9	-7,2	0,6	-1,5	1,1
	G3	0,2	0,5	1,3	0,5	2	0,7	2,5	0,7
	G4	0,3	0,5	1,7	0,6	2,4	0,8	1,7	0,6
	Comparison	G1-G2: ns		G1-G2: ns		G1-G2: ns		G1-G2: *	
	G1-G3: ***		G1-G3: ***		G1-G3: ***		G1-G3: ns		
	G2-G4: *		G2-G4: ***		G2-G4: ***		G2-G4: ns		
	G3-G4: ns		G3-G4: ns		G3-G4: ns		G3-G4: **		
	G2-G4: ***		G2-G4: ***		G2-G4: ***		G2-G4: ns		

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		G3-G4: ns		G3-G4: ns		G3-G4: ns		G3-G4: ns	
Right	G1	3,9	3,5	11,7	4,4	14,5	4,5	5,6	2,7
Hand	G2	3,5	2,9	5,4	3,9	8,1	3,3	3,9	1,5
Grip	G3	0,5	2,7	2,6	4,1	3,9	4,6	4,1	3,8
	G4	0,4	2,8	1,7	2,4	2,8	2,6	2,8	3
	Comparison	G1-G2: ns		G1-G2: **		G1-G2: **		G1-G2: *	
		G1-G3: *		G1-G3: ***		G1-G3: ***		G1-G3: ns	
		G2-G4: *		G2-G4: *		G2-G4: *		G2-G4: ns	
		G3-G4: ns		G3-G4: ns		G3-G4: ns		G3-G4: ns	
Left	G1	5	4,4	11,8	5,4	13,5	5,6	5	2,3
Hand	G2	2,7	2,3	5,7	2,8	7,4	3,1	4,9	2,2
Grip	G3	1,3	3,1	2	2,9	2,4	2,7	2,6	3,5
	G4	0,8	3	1,7	2,7	2,1	2,1	2,4	2,7
	Comparison	G1-G2: ns		G1-G2: **		G1-G2: **		G1-G2: *	
		G1-G3: *		G1-G3: ***		G1-G3: ***		G1-G3: ns	
		G2-G4: *		G2-G4: *		G2-G4: **		G2-G4: ns	
		G3-G4: ns		G3-G4: ns		G3-G4: ns		G3-G4: ns	

$\bar{x}$  (%): The arithmetical average of the percentage change according to the initial value of the related measurement.

G1: Experimental cadet Group

G2: Experimental junior Group

G3: Control Cadet Group groups)

G4: Control Junior Group groups)

BSPP: Before Special Preparation Period

ACP : After Competitive Period

ns :  $p > 0.05$  (there is no statistical significant among groups)

\* :  $p < 0.05$  (there is a statistical significant among groups)

\*\* :  $p < 0.01$  (there is a statistical significant among groups)

\*\*\*:  $p < 0.001$  (there is a statistical significant among groups)

ASPP: After Special Preparation Period

AOP : After Off Period

Statistical significant was found among groups when their % changes of arithmetical averages were compared as seen on the Table 2; in the measurement of height; at the end of the transfer period ( $p < 0.05$ ) -experimental cadet (1,5%) and experimental junior (0,9%), In the measurement of body weight, before special preparation period -experimental cadet (-1,3%) and control cadet (1,2%) ( $p < 0.01$ ), experimental junior (-0,9%) and control junior (1%) ( $p < 0.05$ ); after special preparation period ( $p < 0.001$  -experimental cadet (-1,9%) and control cadet (4,9%), experimental junior (-2,5%) and control junior (2,8%); at the end of competition period -experimental cadet (-2,5%) and control cadet (6,2%), experimental junior (-2,9%) and control junior (3,5%) ( $p < 0.001$ ), control cadet (6,2%) and control junior (3,5%) ( $p < 0.01$ ); at the end of transfer period -experimental cadet (4,1%) and control cadet (6,8%) ( $p < 0.05$ ), control cadet (6,8%) and control junior (4%) ( $p < 0.01$ ), In the measurement of fat %, before special preparation period ( $p < 0.001$ ) -experimental cadet (-1,6%) and control cadet (0,2%), experimental junior (-1,7%) and control junior (0,3%); at the end of special preparation period ( $p < 0.001$ ) -experimental cadet (-5,9%) and control cadet (1,3%), experimental junior (-5,7%) and control junior (1,7%), at the end of competition period ( $p < 0.001$ ) -experimental cadet (-7,7%) and control cadet (2%),

experimental junior (-7,2%) and control junior (2,4%); in the measurement of right hand grip, before special preparation period ( $p < 0.05$ )-experimental cadet (3,9%) and control cadet (0,5%), experimental junior (3,5%) and control junior (0,4%), at the end of special preparation period - experimental cadet (11,7%) and experimental junior (5,4%) ( $p < 0.01$ ), experimental cadet (11,7%) and control cadet (2,6%) ( $p < 0.001$ ), experimental junior (5,4%) and control junior (1,7%) ( $p < 0.05$ ); at the end of competition period -experimental cadet (14,5%) and experimental junior (8,1%) ( $p < 0.01$ ), experimental cadet (14,5%) and control cadet (3,9%) ( $p < 0.001$ ), experimental junior (8,1%) and control junior (2,8) ( $p < 0.05$ ); in the measurement of left hand grip, before special preparation period ( $p < 0.05$ ) -experimental cadet (5%) and control cadet (1,3%), experimental junior (2,7%) and control junior (0,8%); at the end of special preparation period -experimental cadet 11,8%) and experimental junior (5,7%) ( $p < 0.01$ ), experimental cadet (11,8%) and control cadet (2%) ( $p < 0.001$ ), experimental junior (5,7%) and control junior (1,7%) ( $p < 0.05$ ); at the end of competition period -experimental cadet (13,5%) and experimental junior (7,4%) ( $p < 0.01$ ), experimental cadet (13,5%) and control cadet (2,4%) ( $p < 0.001$ ), experimental junior (7,4%) and control junior (2,1%) ( $p < 0.01$ ). significant was not found out in other comparisons ( $p > 0.05$ ).

**Table 3: Percentage Changes of Back Strength, Push-up, Abdominal Shuttle and Anaerobic Power.**

Variable	Groups	BSPP		ASPP		ACP		AOP	
		x (%)	SS	x (%)	SS	x (%)	SS	x (%)	SS
Back Strength	G1	6,7	2,8	9,2	3,2	12,1	4,3	7,2	2,2
	G2	4,3	1,7	6,2	2,4	8,3	3,8	4,5	2,3
	G3	2,6	2,6	4,2	3,9	5,2	3,2	5,1	3,6
	G4	1,5	1,9	2,2	1,4	3,6	1,2	3,2	1
	Comparison	G1-G2: ns		G1-G2: ns		G1-G2: ns		G1-G2: ns	
	G1-G3: *		G1-G3: **		G1-G3: ***		G1-G3: ns		
	G2-G4: *		G2-G4: *		G2-G4: *		G2-G4: ns		
	G3-G4: ns		G3-G4: ns		G3-G4: ns		G3-G4: ns		
Push-up 30 sec	G1	10,5	6,5	20,4	9,6	22,3	10,1	12,4	3,3
	G2	8,9	2,5	15,7	6	18,2	8,7	10,5	2,3
	G3	3,7	5,4	6,9	5,9	10,8	6,2	8,5	4,5
	G4	2,7	4,1	5,4	5,4	8,6	7,3	6,5	3,2
	Comparison	G1-G2: ns		G1-G2: ns		G1-G2: ns		G1-G2: ns	
	G1-G3: *		G1-G3: **		G1-G3: *		G1-G3: ns		
	G2-G4: *		G2-G4: *		G2-G4: *		G2-G4: ns		
	G3-G4: ns		G3-G4: ns		G3-G4: ns		G3-G4: ns		
Abdominal Shuttle 30 sec	G1	9,3	5,2	13,3	6,3	14,9	6,3	5,2	3,2
	G2	9,8	3,7	11,2	4,4	14,2	6,5	5,6	2,2
	G3	2,3	3,2	4,4	3	4,9	3,4	3,6	2,9
	G4	3,1	3,7	5,5	2,8	6,9	4,1	4,3	4,3
	Comparison	G1-G2: ns		G1-G2: ns		G1-G2: ns		G1-G2: ns	
	G1-G3: *		G1-G3: ***		G1-G3: **		G1-G3: ns		

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		G2-G4: *		G2-G4: *		G2-G4: **		G2-G4: ns	
		G3-G4: ns		G3-G4: ns		G3-G4: ns		G3-G4: ns	
Anaerobic Power	G1	5,9	2,5	7,6	2,3	10,3	4,2	6,6	4,8
	G2	3,9	2,3	5,5	1,9	7,2	2,5	3,4	2,5
	G3	1	1	1,5	2,2	2,3	2,3	2,5	1,6
	G4	0,4	0,8	0,8	1,6	1,3	1,8	1,5	3
	Comparison	G1-G2: ns		G1-G2: ns		G1-G2: ns		G1-G2: *	
	G1-G3: ***		G1-G3: **		G1-G3: *		G1-G3: ns		
	G2-G4: **		G2-G4: **		G2-G4: **		G2-G4: ns		
	G3-G4: ns		G3-G4: ns		G3-G4: ns		G3-G4: ns		

$\bar{x}$  (%): The arithmetical average of the percentage change according to the initial value of the related measurement.

G1: Experimental cadet Group

ns :  $p > 0.05$  (there is no statistical significant among groups)

G2: Experimental Junior Group

\* :  $p < 0.05$  (there is a statistical significant among groups)

G3: Control Cadet Group  
groups)

\*\* :  $p < 0.01$  (there is a statistical significant among groups)

G4: Control Junior Group

\*\*\*:  $p < 0.001$  (there is a statistical significant among groups)

BSPP: Before Special Preparation Period

ASPP : After Special Preparation Period

ACP : After Competitive Period

AOP : After Off Period

Statistical significant was found among groups when their % changes of arithmetical averages were compared as seen on the Table 3. In the measurement of back strength, before special preparation period, ( $p < 0.05$ ) -experimental cadet (6,7%) and control cadet (2,6%), experimental junior (4,3%) and control junior (1,5%); at the end of special preparation period -experimental cadet (9,2%) and control cadet (4,2%) ( $p < 0.01$ ), experimental junior (6,2%) and control junior (2,2) ( $p < 0.05$ ); at the end of competition period -experimental cadet (12,1%) and control cadet (5,2%) ( $p < 0.001$ ), experimental junior (8,3%) and control junior (3,6%) ( $p < 0.05$ ).

In the measurement of push-up (30 sec.); before special preparation period ( $p < 0.05$ ) - experimental cadet (10,5%) and control cadet (3,7%), experimental junior (8,9%) and control junior (2,7%), at the end of special preparation period - experimental cadet (20,4%) and control cadet (6,9%) ( $p < 0.01$ ), experimental junior (15,7%) and control junior (5,4%) ( $p < 0.05$ ); at the end of competition period ( $p < 0.05$ ) -experimental cadet (22,2%) and control cadet (10,8%), experimental junior (18,2) and control junior (8,6%).

In the measurement of shuttle (30 sec.); before special preparation period - experimental cadet (9,3%) and control cadet (2,3%) ( $p < 0.05$ ), experimental junior (9,8%) and control junior (3,1%) ( $p < 0.05$ ); at the end of the special preparation period - experimental cadet (13,3%) and control cadet (4,4%) ( $p < 0.001$ ), experimental junior (11,2%) and control junior (5,5%) ( $p < 0.05$ ); at the end of competition period -experimental cadet (14,9%) and

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control cadet (4,9%) ( $p < 0.01$ ), experimental junior (14,2%) and control junior (6,9%) ( $p < 0.05$ )

In the measurement of anaerobic strength; before special preparation period - experimental cadet (5,9%) and control cadet (1%) ( $p < 0.001$ ), experimental junior (3,9%) and control junior (0,4%) ( $p < 0.01$ ); at the end of the special preparation period - experimental cadet (7,6%) and control cadet (1,5%), experimental junior (5,5%) and control junior (0,8%), at the end of competition period - experimental cadet (10,3%) and control cadet (2,3%) ( $p < 0.01$ ), experimental junior (7,2%) and control junior (1,3%) ( $p < 0.05$ ). Significant was not found out in other comparisons ( $p > 0.05$ ).

**Table 4: Percentage Changes of Flexibility, Aerobic Capacity and Speed**

Variable	Groups	BSPP		ASPP		ACP		AOP	
		x (%)	SS	x (%)	SS	x (%)	SS	x (%)	SS
Flexibility	G1	8,9	7	18,8	9,4	25,1	11,6	9,1	4,9
	G2	6,6	6,8	13,4	8,4	18,5	13,3	8,5	4,7
	G3	2	7,4	3,2	6,3	3,7	10,3	3,7	8,7
	G4	1,5	5,1	3	4,4	3,4	8,7	3,5	10,5
	Comparison	G1-G2: ns		G1-G2: ns		G1-G2: ns		G1-G2: ns	
Aerobic Capacity	G1	8,9	7	18,8	9,4	25,1	11,6	9,1	4,9
	G2	6,6	6,8	13,4	8,4	18,5	13,3	8,5	4,7
	G3	2	7,4	3,2	6,3	3,7	10,3	3,7	8,7
	G4	1,5	5,1	3	4,4	3,4	8,7	3,5	10,5
	Comparison	G1-G2: ns		G1-G2: ns		G1-G2: ns		G1-G2: ns	
Speed 40 yard	G1	-2	1,1	-4,7	1,2	-6,7	1,2	-3	5,3
	G2	-2	3	-5,2	3,4	-7,2	3,5	-3,9	1,2
	G3	0,6	4,6	-1,5	5,3	-1,6	6,1	0,4	5,6
	G4	-0,5	6,1	-2,8	4,9	-2,8	4,8	-2,3	4,6
	Comparison	G1-G2: ns		G1-G2: ns		G1-G2: ns		G1-G2: ns	
		G1-G3: ns		G1-G3: ns		G1-G3: ns		G1-G3: ns	
		G2-G4: ns		G2-G4: ns		G2-G4: ns		G2-G4: ns	
		G3-G4: ns		G3-G4: ns		G3-G4: ns		G3-G4: ns	

$\bar{x}$  (%): The arithmetical average of the percentage change according to the initial value of the related measurement.

G1: Experimental cadet Group

G2: Experimental Junior Group

G3: Control Cadet Group  
groups)

G4: Control Junior Group  
groups)

BSPP: Before Special Preparation Period

ACP : After Competitive Period

ns :  $p > 0.05$  (there is no statistical significant among groups)

\* :  $p < 0.05$  (there is a statistical significant among groups)

\*\* :  $p < 0.01$  (there is a statistical significant among groups)

\*\*\*:  $p < 0.001$  (there is a statistical significant among groups)

ASPP : After Special Preparation Period

AOP : After Off Period

Statistical significant was found among groups when their % changes of arithmetical averages were compared as seen on the Table 4; in flexibility; before special preparation period ( $p < 0.05$ ) - experimental cadet (8,9%) and control cadet (2%), experimental junior (6,6%) and control junior (1,5%); at the end of the special preparation period ( $p < 0.001$ ) - experimental cadet (18,8%) and control cadet (3,2%), experimental junior (13,4%) and control junior (3%), at the end of competition period ( $p < 0.001$ ) -experimental cadet (25,1%) and control cadet (3,7%), experimental junior (18,5%) and control junior (3,4%), in aerobic capacity; before special preparation period ( $p < 0.001$ ) -experimental cadet (13,3%) and control cadet (0,7%) , experimental junior (11,6%) and control junior (1%); at the end of the special preparation period ( $p < 0.001$ ) -experimental cadet (16,4%) and control cadet (2,2%), experimental junior (16,6%) and control junior (2,5%), at the end of competition period ( $p < 0.001$ ) -experimental cadet (19,2%) and control cadet (3,4%), experimental junior (19,6%) and control junior (3,7%). Significant was not found out in other comparisons ( $p > 0.05$ ).

### Discussion

*Height:* Çalış and et al (14), in their study, found out the height changes of 3 different groups including the students who are playing sports regularly, attending and not attending the physical education lesson in a year. In this study, they have found out the height of the subjects increase significantly in each three group and the height increase occurred were in very close level to each other. Housh and et al (16) found out the height average of a 15,5 year old wrestler as 167,93 cm, after a year 170,77 cm and after two years 172,26 cm in their study. The height average of the wrestlers increased 1,69% after a year and 0,9% after 2 years. In our study it was found out that the difference in height increase among cadet and junior wrestlers was only significant in transfer period ( $p < 0.05$ ), was not statistically significant in other periods ( $p > 0.05$ ). We have found out that the height of the Cadet wrestlers according to Cadet sedentary group and of junior wrestlers according to junior sedentary group does not increase significantly in terms of statistically in any periods ( $p > 0.05$ ). We determined that the height increased on cadet sedentary group more than junior sedentary group in all periods, but there is not a statistical significant among the increases of two groups in any period ( $p > 0.05$ ).

*Body Weight:* Çalış and et al. (14) found out in the study that the weight decreased on the students attending the physical education lesson as 12% and on the students playing sports regularly as 0.03%, the weight increased on the students not attending the physical education lesson as 1,9%. We have found out in our study that the weight decreased on cadet and junior wrestlers in training periods and increased in transfer period on both groups. We have found out the difference between weight changes (decrease or increase) were not statistically significant ( $p>0.05$ ). We determined that while the weight on cadet and junior wrestlers were decreasing, the weight on cadet and junior sedentary groups increased in training periods and there was a statistically significant between the difference of changes in both groups ( $p<0.05$ ).

*Body Fat %:* Baer and et al. (17) found out the body fat percentage of students attending High School as 14,4 mm. before season and 12 mm. at the end of the season in their study in 1982. They found out the body fat percentage at the end of the season was 12% less than the body fat percentage before season. The differences between two measurements were stated to be significant. Utter and et al. (18) found out the body fat percentages of the wrestlers attending High School in the middle of the season were significantly lower than before season ( $p<0.05$ ).

In our study we found out the body fat percentage decreased on cadet and junior wrestlers in training periods and there was not a statistically significant among the % changes of both groups ( $p>0.05$ ). Also in transfer period we determined the % fat increased on both groups according to the competition period. While the % fat was lower at the beginning on wrestlers than sedentary group and was decreasing in training period on wrestlers, we found out that it increased on sedentary group and there was a statistically significant among the differences of groups ( $p>0.05$ ).

*Hand Grip:* Ziyagil and et al. (11) found out the Hand Grip of wrestlers increased in every period as 29,34% in left hand and 35,91% in right hand in order to observe the annual changes in body composition and physical properties. Researchers declared that the Hand Grip increased significantly in both hands ( $p<0.05$ ). Freichlag (19) measured the average hand grasp strength of wrestlers attending High School with 104 training as 37,72 kg. in 1984 on November and 42,27 kg. after 3 months, on February. He determined that the Hand Grip increased 12,1% in average 3 months ( $p<0.05$ ). Song and Cipriano (7) found out the right hand grip as 51,1 kg before training and 52,2 kg after training; the left hand grip as 49,1

kg before training and 49,9 kg after training in the study they 4-month training program applied to the 18-24 year-old university wrestlers. In the study, the hand grasp strength increased as 2,2% in left hand and 1,6% in right hand. Kılıç (21) found out that while the right Hand Grip showed development in Training group as 5,61%; in control group no changes were seen, the left Hand Grip increased as 6,09% in Training group, 2,08% in control group in the study investigate the effects on some properties of quick strength training applied in 8 weeks duration to Cadet wrestlers. The researcher stated that right and left Hand Grips increased significantly in Training group ( $p < 0.05$ ). We found out in our study that while the right and left hand grips of cadet and junior wrestlers were increasing in training period, they were decreasing in periods which training was not done. We found out the right and left hand grip on cadet wrestlers increased more than the junior wrestlers in every period and this increase was statistically significant in other periods except before special preparation period ( $p < 0.001$ ). The right and left hand grip increased on cadet and junior wrestlers more than the sedentary groups. We determined there was a statistically significant in general preparation, special preparation and competition periods on cadet wrestlers according to cadet sedentary group and junior wrestlers according to junior sedentary group ( $p < 0.05$ ) and also there was not a statistically significant in transfer period ( $p > 0.05$ ) in the difference among increases. We found out the hand grip on junior sedentary group increased more than cadet sedentary group however there was not significant in the difference among the increases of both groups ( $p > 0.05$ ).

*Back Strength:* Akbal (1) found out the back strength of Training group wrestlers as 182,45 kg. in first measurement and 198,45 kg. in second measurement done after three months, of control group wrestlers as 161,03 kg. in first measurement and 165,19 kg. in second measurement done after 3 months in the study investigate the effects on muscle strength of physical studies in training program of preparation period on junior wrestlers. The increase in Training group (8,8%) was more than the increase in control group (2,6%) but the back strength of both groups increased significantly. We found out in our study the back strength was lower on cadet wrestlers than junior wrestlers, was increasing in training periods on each group and decreasing in transfer period. We found out the difference between the increases of both groups were not statistically significant in general preparation, special preparation and competition periods ( $p > 0.05$ ). The back strength increased on cadet and junior wrestlers more than cadet and junior sedentary group. We found out the

differences between the increases were statistically significant on the cadet wrestlers according to cadet sedentary group and on junior wrestlers according to junior sedentary group in general preparation, special preparation and competition periods ( $p < 0.05$ ), but they were not statistically significant in transfer period ( $p > 0.05$ ). Back strength increased on cadet sedentary group more than junior sedentary group but the difference among increases of both groups were not found statistically significant in any period ( $p > 0.05$ ).

*Push-up (30 sec.):* Aydos and Kürkçü (15) found 36,45 rep. in 13-14 year-old Training group and 16,07 rep. in 13-14 year-old control group, 40,18 rep in 15-16 year-old Training group and 20,7 rep in 15-16 year-old control group, 37,27 rep in 17-18 year-old Training group and 17-18 year-old control group push-up (30 sec.) test. They determined the difference among Training and control groups as 126,8% in 13-14 ages, 94,1% in 15-16 ages and 87,94% in 17-18 ages. Researchers declared that these differences were statistically significant. In our study although the push-up (30 sec.) values were lower on cadet wrestlers than junior wrestlers at the beginning, we found out they increased in training periods, but the difference among increases of both groups were not significant in any period ( $p > 0.05$ ). Push-up values increased on cadet and junior wrestlers more than cadet and junior sedentary groups. We found out the differences among the increases on cadet wrestlers according to cadet sedentary group and on junior wrestlers according to junior sedentary group were statistically significant in general preparation, special preparation and competition periods ( $p < 0.05$ ), and were not significant in transfer period ( $p > 0.05$ ).

*Abdominal Shuttle (30 sec.):* Kılıç (21) found out the results of shuttle test in Training group as 25,88 rep. in 1<sup>st</sup> measurement, 27,94 rep in 2<sup>nd</sup> measurement and in control group as 26,29 rep. in 1<sup>st</sup> measurement, 25,43 rep. in 2<sup>nd</sup> measurement in the study investigate the effects on some properties of quick strength training applied in 8-week duration on Cadet wrestlers. While the shuttle values were increasing as 7,37% in Training group, they decreased as 3,38% in control group. Researcher claimed that the shuttle values increased significantly in both groups. We found out in our study that the shuttle values of Cadet and junior wrestlers increased in training periods and decreased in periods which training was not done. We determined that the difference in the increases of both groups was not significant in any periods ( $p > 0.05$ ). The shuttle values increased on cadet and junior wrestlers more than cadet and junior sedentary groups in every period. We found out the differences among the increases were significant ( $p < 0.05$ ) on cadet wrestlers according to

cadet sedentary group and on junior wrestlers according to junior sedentary group in general preparation, special preparation and competition periods, and were not significant in transfer period ( $p>0.05$ ). We found out the shuttle values increased on cadet sedentary group more than junior sedentary group in every period however the differences among these increases were not significant ( $p>0.05$ ).

*Anaerobic Power:* Ziyagil and et al. (11) measured the anaerobic strength (Lewis Nomogramme) of Cadet wrestlers as 89,93 kg.-m/sec. before season and as 106,42 kg.-m/sec. after season in order to observe annual changes on physical properties and body composition. Anaerobic strength of cadet wrestlers increased 18,3% in a year. Researchers stated that this increase was significant. In our study we found out the anaerobic strength on cadet wrestlers were lower than junior wrestlers, increased more in every period however the differences among the increases of both groups were not significant in general preparation, special preparation and competition periods ( $p>0.05$ ). Anaerobic strength decreased on both groups in periods which training was not done. Anaerobic strength increased on cadet and junior wrestlers more than cadet and junior sedentary groups. We found out the differences between increases were statistically significant on cadet wrestlers according to cadet sedentary group and on junior wrestlers according to junior sedentary group in general preparation, special preparation and competition periods ( $p<0.05$ ), were not significant in transfer period ( $p>0.05$ ). We determined that the anaerobic strength values on cadet sedentary group were lower than junior sedentary group at the beginning and the differences between increases of both groups were not statistically significant ( $p>0.05$ ).

*Flexibility:* Ziyagil and et al. (11) measured the flexibility of wrestlers (sit and reach) as 29,08 cm. before season and 35,30 cm. at the end of the season. The flexibility of wrestlers increased 21,4% in a year. Researchers mentioned the difference between two measurements significantly. Çalış and et al. (14) determined the flexibility increased as; 36,6% on the students attending physical education lesson, 9,8% on the students not attending physical education lesson and 42,2% on students playing sport regularly. Researchers declared the flexibility values increased significantly on the groups attending physical education lesson and playing sport regularly and not significantly on the group not playing sport. In our study, we found out the flexibility on Cadet wrestlers were more than junior wrestlers at the beginning and increased more in every period however the differences among increases of both groups were not significant in any period ( $p>0.05$ ). Flexibility

decreased in both groups in period which training was not done. Flexibility increased on Cadet and junior wrestlers more than cadet and junior sedentary groups in every period. We found out the differences among increases were statistically significant ( $p < 0.05$ ) on cadet wrestlers according to cadet sedentary group and on junior wrestlers according to junior sedentary group in general preparation, special preparation and competition periods but they were not significant in transfer period ( $p > 0.05$ ). Flexibility values increased on cadet sedentary group better than junior sedentary group at the beginning and more than in every period, but we determined the difference among increases were not statistically significant ( $p > 0.05$ ).

*Aerobic Capacity:* Ziyagil and et al. (11) measured the aerobic capacity (Cooper test) of Cadet wrestlers as 48,84 ml/kg./min. At the end of season. Aerobic capacity of Cadet wrestlers increased 1,49% in a year. Researchers claim this difference was not significant ( $p > 0.05$ ).

Song and Cipriano (20) measured the aerobic capacity on 18-24 year-old university wrestlers as 69 ml./kg./min at the end of the season which was 62,1 ml./kg/min. before season. Aerobic capacity increased as 12,3%. Researchers declared this increase was significant.

In our study, we found the aerobic capacity on cadet and junior wrestlers were close to each other and the difference among the increases of both groups were not significant in any period ( $p > 0.05$ ). Anaerobic capacity on both groups decreased in period which training was not done. We determined that the aerobic capacity on cadet and junior wrestlers increased more than Cadet and junior sedentary groups in every period and the differences among increases were significant in general preparation, special preparation and competition periods ( $p < 0.001$ ). We found out the aerobic capacity values of cadet and junior sedentary groups increased similarly to each other and the differences among increases were not significant in any period ( $p > 0.05$ ).

*Speed:* Ziyagil and et al. (11) measured the speed (50 m.) of Cadet wrestlers as 7,76 sec. before season and 7,29 sec. at the end of season and found out the speed of junior wrestlers increased 6,06% in a year. Researchers stated the difference between two measurements as significant ( $p < 0.05$ ). In our study, we found out the speed was same on Cadet and junior wrestlers at the beginning, the differences among increases of both groups were not significant in periods which training was not done ( $p > 0.05$ ). We found the speed decreased in both groups in period which training was not done. We found out the speed on

Cadet and junior wrestlers increased more than cadet and junior sedentary groups in every period however the differences among increases were not significant ( $p>0.05$ ). We found out the differences among speed changes were not significant on control cadet and junior groups ( $p>0.05$ ). In our study, we found out the aerobic capacity values were close to each other on Cadet and junior wrestlers at the beginning, increased in close rate to each other in training periods, and the differences among increases of both groups were not significant ( $p>0.05$ ). Anaerobic capacity increased in both groups in the period which training was not done. Anaerobic capacity increased on cadet and junior wrestlers more than cadet and junior sedentary groups in every period. We determined the differences among increases were significant in general preparation, special preparation and competition periods ( $p<0.001$ ). We found out the anaerobic capacity on cadet and junior sedentary groups were close to each other at the beginning and increased closely to each other in every period, the differences among the increases were not significant ( $p>0.05$ ).

### **Conclusions**

The strength, speed, aerobic capacity, flexibility, anaerobic strength and capacities of wrestlers were decreased, the weight and body fat percentage were increased despite the fact that they did not train in transfer period. Due to this, the necessity of passing the transfer period with active rest by wrestlers was concluded. It can be said that the same training program can be used on Cadet and junior wrestlers in the fact that there was not significant difference among the anaerobic strength, flexibility, speed, strength, aerobic capacity, anaerobic capacity, weight and body fat percentages of the junior and cadet wrestlers with the applied common training program. In order to observe the developments more effectively in physiological properties of wrestlers, they must be evaluated before season, at the end of general preparation period, at the end of special preparation period, at the end of competition period and at the end of transfer period. As a result, in case of the insufficiency in these properties of the wrestlers, the training program should be replanned and changed, and the deficiencies should be eliminated before important competition.

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