Comparison of the Physical and Physiological Capacities of Elite Turkish Wrestlers and the Wrestlers of the U.S. National Wrestling Team

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COMPARISON OF THE PHYSICAL AND PHYSIOLOGICAL CAPACITIES OF ELITE TURKISH WRESTLERS AND THE WRESTLERS OF THE U.S. NATIONAL WRESTLING TEAM

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ABSTRACT
The purpose of the present study is to determine the physical and physiological characteristics of international caliber Turkish freestyle wrestlers and then compare these results with the physiological variables of the U.S. National Freestyle Wrestling Team. The parameters of height, age, weight, body fat percentage, vital capacity, aerobic power (MaxVO_2), speed (36.56 m), 400 m run, 2400 m run, right and left hand grip strength and the physiological traits concerning dominant grip and weak grip were selected for comparison. For the purpose of comparing the physiological parameters of the elite Turkish wrestling team and the U.S. national freestyle wrestling team, a t test technique was employed at the 0.05 significance level. In the comparison of the physical and physiological parameters of the two teams, statistical differences in disfavor of the elite Turkish wrestling team were determined in the parameters of aerobic power (Max VO_2), 400 m run and the 2400 m run. No statistical differences were found between the other physiological parameters of the two teams. These results indicate that Turkish wrestlers may work and train less than foreign elite wrestlers.
Key Words: profiles, physical and physiological tests.

INTRODUCTION

Success in wrestling is primarily a matter of skills, combined with intellect and strength. Other important motor traits that contribute to success include quickness, endurance and flexibility. Wrestling is a high-paced and dynamic branch of sports that requires continuous movement during the contest. In order to meet the demands of the sport in terms of circulation, respiration and muscle system, wrestlers have to enhance and strengthen their motor skills, aerobic and anaerobic capacities through various exercise methods.

While Hellicksen (9) reports the presence of a significant relationship between a high level of aerobic capacity and success in wrestling, Taylor (18) states that wrestling demands more body strength than any other branch of sports, and that wrestlers are proportionally the strongest athletes. Akgun (1) states that wrestling is a branch of sport that requires the possession of various functional traits; muscle strength, short reaction time, agility, neuromuscular coordination, superior static and dynamic balance, high anaerobic capacity and a high aerobic capacity. Although all these elements of physical fitness are important for wrestling, he states that the two most important are aerobic and anaerobic capacities.

The term physical fitness is generally used to describe a part of the physical skills necessary to succeed in sports. Burke (4) lists physical fitness elements as strength, aerobic power, anaerobic power, muscular endurance, speed, agility, balance and body composition. Astrand (2), on the other hand, divides physical fitness into two groups: the measurable elements of motor performance, and the aerobic functional capacity, and accordingly the capacity to carry or use oxygen in the body.

In order to develop these traits, wrestlers need to carry out training in a regular, planned and scientific manner. The purpose and content of wrestling training have to focus on ensuring that physical skills and physiological capacities are suitable for wrestling contests. The high level of physiological characteristics of elite athletes constitutes a field of study that that continues to gain importance and is closely followed by scientists and trainers. This includes scientific studies with introducing new areas of research. The goal of the training programs applied to athletes is to enhance their physical capacities and skills (12). Determining wrestlers' physiological traits and capacities is required for their development and success. In consideration of this information, the purpose of the

present study is to identify the physical and physiological traits of wrestlers, and to enable trainers to remediate any inadequacies that are discovered and thus improve a wrestler's performance.

METHODS

For this study one wrestler for each weight category was selected from elite Turkish wrestlers who had won a medal in at least one European or world championship, and their voluntary consent for participating in the study were obtained. In order to determine physical fitness; age, height, weight, vital capacity, double grip strength, strong grip, weak grip, body fat percentage, aerobic power ($_2$2$_2$), 35.56 m (40 Yard), 400 m and 2400 m run tests were implemented.

While a stadiometer and a scale were used to measure height and weight, body fat percentage was determined through skinfold measurements (Biceps, Triceps, Suprailiac, Scapula, Chest and Thigh) were carried out with a skinfold caliper and then applying Green's formula (8), grip strength was measured with a hand grip dynamometer, aerobic power ($MaxVO_2$) was measured through a Cooper test (12 minute run) and calculated through Clark's (5) formula, and the 36.56 m sprint (40 yards), 400 m and 2400 m runs were measured with a stop-watch.

The wrestlers were asked not to eat, use medication, use stimulants such as tea, coffee or cigarettes or perform demanding exercises for at least 4 hours before the tests. In order to enable the wrestlers to exhibit their maximal performance, the tests were spread on to three days.

RESULTS

Data obtained from elite Turkish wrestlers were compared to the physiological parameters of the wrestlers from the U.S. national wrestling team (13), and t value was employed in the calculation of the statistical differences between the two teams. The level of significance accepted for the tests was 0.05. These results are shown in Table 1.

Table 1. Physical and physiological parameters of elite Turkish freestyle wrestling team and the U.S. national freestyle wrestling team.

Teams	Elite Turkish team				U.S. National team			
Tests	N	x̄	SD	SEM	N	x̄	SD	SEM
Age (years)	10	24.9	3.75	1.18	8	24.88	2.42	0.85
Height (cm)	10	172.9	9.96	3.15	8	166.29	11.48	4.07
Weight (kg)	10	75.3	18.42	5.82	8	68.55	17.14	6.07
Vital Capacity (L)	10	4.63	0.87	0.27	8	4.14	0.79	0.28
Double Grip Strength (kg)	10	81.9	17.65	5.58	8	99.13	26.45	9.37
Strong Grip (kg)	10	43.8	9.78	3.09	8	50.38	13.15	4.66
Weak Grip (kg)	10	38.1	8.41	2.66	8	48.75	13.51	4.79
Body Fat (%)	10	7.92	1.61	0.5	8	9.45	3.24	1.14
Max VO$_2$ (ml/kg/min.)	10	48.9	3.79	1.2	8	55.29	4.28	1.51*
36.56 m Sprint (40 Yard)	10	5.35	0.24	0.07	8	5.28	0.36	0.12
400 m. Run (s)	10	71.6	5.5	1.74	8	63.37	3.58	1.26*
2400 m run (min)	10	10.44	52.97	16.76	8	8:49.5	27.37	9.70*

* = Parameters with statistically significant difference

DISCUSSION

For this study, the physical and physiological parameters of elite Turkish freestyle wrestlers and wrestlers from the U.S. national freestyle wrestling team that participated in the World Cup Competition were calculated and compared. No statistical difference could be found between the average ages, heights and weights of the two teams. The average ages of wrestlers, was 25 years in both the American elite wrestlers and Turkish teams. In terms of height, Scott (13) reported the average height of American elite wrestlers to be 173.0 cm, and data reported from Turkish teams shows 173.3 cm in the Sekerspor team (6), and the 172.5 cm average height of U-21 Turkish freestyle and Greco-Roman wrestling teams (3) are parallel with the average height of the two teams examined in the present study.

Comparing the vital capacities of the two teams showed no statistically significant difference. Previous studies conducted on this matter report the average vital capacities of Canadian national wrestlers (14) and American collegian wrestlers (15) to be 4.9 L and 5.06 L respectively. On the other hand, in the study conducted on 10 Turkish wrestlers, Akgun (1) determined the wrestlers' average vital capacity to be quite higher with 5.48 L. This difference may have resulted from the heavier weights of the wrestlers that participated that study. However, Akgun (1) states that "what really matters is not a high vital capacity, but the ability to use lung capacity in a maximal manner."

While no statistically significant difference could be found between the teams in terms of grip strengths (double grip strength, strong grip and weak grip); the U.S. national team shows a clear superiority. The fact that the U.S. national team is stronger in terms of double grip strength, strong grip and weak grip indicates that they are stronger than Turkish elite wrestlers also in terms of general physical strength. Wrestling requires more body strength than any other branch of sports. Studies report that wrestlers are the stronger than athletes involved in other branches (18). In a sense, grip strengths provide general information on physical strength. The studies conducted on Canadian and Japanese national teams (17), the study by Donmez (6) conducted on the Turkish club teams, and Baykus' (2) study conducted on U-21 national Greco-Roman wrestling team all report similar values.

Comparing the body fat levels of the two teams showed no statistically significant difference. Wrestlers' body fat ratio varies between 7% and 10% as also suggested by Hursh (11). In support of this, the average body fat percentage of 49 Canadian elite freestyle wrestlers was reported to be 8.2% (17), while the same was determined to be 9.81% for 33 elite American wrestlers (5), 9.1% and 8.96% for the wrestlers of Turkish club teams (6). Similarly, body fat ratio averages of Turkish freestyle U-21 national team was reported to be 8.25%, while the same was determined as 8.56% for a U-21 Greco-Roman national team (2).

A comparison of the maximum oxygen consumption capacities (Max VO_2) shows that there is a statistically significant difference in favor of the U.S. national team. Turkish elite wrestlers' maximum oxygen consumption capacities are not only lower than the wrestlers of the U.S. national team, but also quite lower than the values reported by Saltin and Astrand (16), Hellicksen (9) and Sharratt (14). The lower maximum oxygen consumption capacity of the Turkish team may result in serious problems in terms of achieving success in international competitions, because of the reports that demonstrate that there is a strong relationship between a high level of aerobic capacity and a good wrestling performance (9). This indicates that, in comparison with their foreign rivals, Turkish wrestlers seem to train less for aerobic capacity.

No statistically significant difference could be found between the two teams in terms of 36.56 m (40 yard) sprint. Still, the U.S. team has a slight superiority. 40 yard run are indicative of reaction time, explosive strength and anaerobic energy.

A statistically significant difference in favor of the U.S. team was determined in terms of 400 m run. In other studies included in the literature the average times of 33 American elite wrestlers and 27 young American elite collegian wrestlers (13) were reported to be 67.96 seconds and 65.8 seconds respectively, both better than the average of the Turkish team. Since a 400 m run is performed primarily through anaerobic processes, it reflects the same energy system character of wrestling (1). Anaerobic exercise capacity is used as an important factor in international wrestling competitions (10). Therefore, this can be considered as a highly significant effect that may affect Turkish wrestlers' performances in a negative manner.

Another statistically significant difference in favor of the U.S. team was found in the final test, a 2400 m run. Since the 2400 m run is primarily based on aerobic power, it is in parallel with maximum oxygen consumption (aerobic power) capacity. It was determined that young American elite wrestlers 2400 mm (13) and American collegian elite wrestlers (10) are better than the Turkish team with average run times of 9:22.0 and 9:37.00 seconds respectively. This indicates that the Turkish elite wrestlers are not able to complete the 2400 m run in the times produced in American wrestler groups... The sole reason for this is inadequate aerobic power. This may be rectified by including more aerobic exercises in training, and conducted with more intensity.

As a result, it was determined that the Elite Turkish wrestlers are significantly weaker than the wrestlers of the U.S. national freestyle wrestling team in terms of 400 m run, aerobic power (MaxVO_2) and the 2400 m run.

Considering the fact that wrestling demands a mixture of aerobic and anaerobic power, it is clear that the physical condition of Turkish elite wrestlers may negatively affect their competitive success. It is essential that the planning for training must increase the focus on developing these traits.

The success of the U.S. National Team, which conducts their training with a large emphasis on physical preparation, in international competitions is well known. On the other hand, elite Turkish wrestlers' inadequacies based on a lack of training and particularly in terms of aerobic capacity, were confirmed by means of this study. In order to be more successful, elite Turkish wrestlers need to conduct training that would develop their anaerobic and aerobic energy systems. Although energy systems capacities are not the only factors that brings success in wrestling, they are very important ones.

CONCLUSION

In recent years, determination of the physical traits of elite athletes has rapidly gained importance among sport scientists and high level trainers. Determining the physiological traits of elite athletes is very important for developing new training programs, controlling the programs that are presently in use, and measuring the performance levels of athletes and applying this information when deciding on the tactics to be followed during the competitions, are all important applications of the information gained from physical and physiological testing. We believe that this study will constitute a reference for future studies and for determining the physiological norms for wrestlers.

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