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Are Functional Trainings Effective on Male Students of Vocational School of Health Services?*

Fonksiyonel Antrenmanlar Sağlık Hizmetleri Meslek Yüksekokulu Erkek Paramedik Öğrencileri Üzerinde Etkili midir?

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ABSTRACT

In this study, it was aimed to examine the effects of functional training applied for eight weeks on the body composition and some physical fitness parameters of male volunteer paramedic students studying at a university's health services vocational schools. In order to determine the effects of functional training applied for eight weeks on body composition (body weight, height, body fat percentage, body mass index), standing long jump, flexibility, push-ups, sit-ups, speed and balance parameters, a pre-test-post-test protocol was applied and the difference between the two measurements was calculated. Normality and T-Tests were used in the analysis of all parameters. Significance was determined at the $p<0.05$ level. Pretest-posttest modeling was used in the modeling of the tests. Statistically significant differences were found in the pre-test-post-test values of all parameters examined ($p<0.05$). Significant differences or decreases were observed between the parameters measured at the beginning and end of the eight-week period. It was determined that with regular exercises, the values of body weight normalized with gradually decreasing, also there is a positive effect in other parameters both in terms of sports and health. The importance of following these parameters, which are important markers in terms of health, in terms of health problems that may be experienced in the future and taking the necessary precautions, and the necessity of the physical performance of male paramedic students in the professional sense have emerged.

Keywords: Functional Training, Paramedic, Sports Training

ÖZET

Yapılan bu çalışmada sekiz hafta boyunca uygulanan fonksiyonel antrenmanların bir üniversitenin sağlık hizmetleri meslek yüksekokullarında eğitim gören gönüllü paramedik erkek öğrencilerinin vücut kompozisyonu ve bazı fiziksel uygunluk parametreleri üzerindeki etkilerinin incelenmesi amaçlanmıştır. Sekiz hafta boyunca uygulanan fonksiyonel antrenmanların vücut kompozisyonu (vücut ağırlığı, boy uzunluğu, vücut yağ yüzdesi, beden kütle indeksi), durarak uzun atlama, esneklik, şınav, mekik, sürat ve denge parametreleri üzerindeki etkilerini belirlemek amacıyla ön test – son test protokolü uygulanmış, iki ölçüm arasındaki fark hesaplaması yapılmıştır. Tüm parametrelerin analizinde Normallik ve T Testi kullanılmıştır. Anlamlılık $p<0.05$ düzeyinde belirlenmiştir. Testlerin modellemesinde ön test- son test modellemesi kullanılmıştır. İncelenen tüm parametrelerinde ön test-son test değerlerinde istatistiksel olarak anlamlı farklılık tespit edilmiştir ($p<0.05$). Sekiz haftalık sürenin başında ve sonunda ölçülen parametreler arasında anlamlı farklılık ya da azalmalar görülmüştür. Yapılan düzenli egzersizler ile vücut ağırlığı değerlerinin azalarak normalleştiği, diğer parametrelerde de hem sportif açıdan hem de sağlık açısından bir olumlu bir etki meydana geldiği saptanmıştır. Sağlık açısından önemli belirteçler olan bu parametrelerin ileriki yıllarda yaşanabilecek sağlık sorunları açısından takibinin yapılmasının ve gerekli tedbirlerin alınmasının önemi ve mesleki anlamda erkek paramedik öğrencilerinin fiziksel performansın gerekliliği ortaya çıkmıştır.

Anahtar Kelimeler: Fonksiyonel Antrenman, Paramedik, Sportif Eğitim

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INTRODUCTION

Sports have an important place in the education of young generations in terms of physical and spiritual aspects. Sports, which is generally seen as a set of systematic physical movements in the form of competition, also contribute to increasing productivity in working life, developing personality and socializing the individual.[1] According to Zengin and Hergüner (2015), sports require planned work and obeying the rules by using different fields for various purposes based on mental and physical competition, evaluated by weight, meter, time measurement units and numbers.[2] In our age, physical education and sports are considered a part of general education in the education programs of developed societies. Because the purpose of physical education and sport is to contribute to the goals of general education through movement, considering that it is not very easy to acquire movement skills and the habit of doing sports that are not acquired before a certain age, physical education and sports practices are as important as other courses during the university period and play a vital role in the future lives of students. The positive utilization of this role and popularizing of sports are highly significant for students' development.[3] In other words, keeping them physically fit and healthy, it contributes to their socio-cultural development. Also, it enables them to adapt to their lessons more efficiently with a relaxed mind.[4]

Physical activities and exercises for sportive performance can be expressed as a set of efforts for success during the fulfillment of a physical task that needs to be done. It is known that these efforts have a purpose and a purpose or a target. The human body shows a significant structural and functional adaptation to regular exercises. The fact that this harmony is achieved as a result of specific exercises aimed at improving the unique performance ability clearly reveals the science and importance of training. In countries where sports are done scientifically, the training process has been the subject of multidimensional research, observations and applications.[5]

Although the view that regular physical activity prevents diseases or delays their symptoms is not new, this hypothesis is still debated. Two developments in modern life have increased the interest in research in this field. The first is that advanced technology changes the way of work and transportation, making less physical activity necessary in daily life, and the second is that disease and death are caused by chronic degenerative diseases instead of infections and infectious diseases.[6]

Sports for health, elite or professional sports for cultural purposes, and undoubtedly physical education and sports, previously called physical activity in modern sports sciences, increase the quality of life. However, despite the great benefits of sports, many experts have argued that excessive physical activity has adverse effects. The level of exercise addiction, which researchers frequently discuss, is supported by limited studies, especially the maximum addiction potential of elite and extreme sports.[7]

Many factors, such as nutrition, heredity, climate and environmental conditions, play a role in the protection and development of human health.[8,9] On the other hand, problems such as obesity or physical inactivity are encountered due to nutritional disorders, economic problems, irregular eating habits, regular skipping meals, unhealthy food preferences, and lack of exercise caused by mass eating during university education.[10]

It is known that every profession has its physical difficulties. These challenges are increasingly prevalent in today's life. We realize that through sports, we can overcome these factors that partially challenge our way of living and make our lives and professional productivity easier. Despite today's technological advancements, ambulance workers are still required to perform rescue and transportation tasks relying on their own physical strength and muscular endurance.[11]

This study was carried out in order to contribute to the importance of personal health norms and efficient and sustainable physical performances of an occupational group that requires urgent intervention for the purpose of saving life and is of vital importance. The most crucial point of the studies on paramedic students is to determine the physical fitness values of the students related to health and skills and to make the necessary interventions. Therefore, this study aims to examine the effects of functional training on body compositions and some physical parameters of the Health Vocational School students in the Physical Education and Body Building courses they studied for eight weeks.

MATERIAL AND METHOD

Participants

The study sample comprised fifteen healthy male students from the Paramedics and Emergency program at Gazi University's Vocational School of Health Services. These individuals, aged between 18-24 years with an average age of 23.73±10.43 years, average height of 178.40±5.61 cm, and average body mass index of 23.20±1.55 kg/m^2, participated voluntarily. Before their involvement, the participants were thoroughly informed about the study's objectives, content, and methodology, and their explicit consent was obtained.

Tests and Training Protocol

The study involved an eight-week mixed-modal training program to enhance endurance, strength, and flexibility. This program was executed four times weekly (Monday, Wednesday, Friday and Sunday) with each session lasting 90 minutes. The training regimen encompassed circuit and functional training exercises performed at the functional training application area in the sports center affiliated with the Vocational School of Health Services at Gazi University.

Each training session followed a standardized format: a warm-up and stretching period (10-15 minutes), a demonstration of the exercises (5-10 minutes), the main functional training exercise block (55-60 minutes), and a concluding cool-down and stretching phase (5-10 minutes).

To ensure correct execution of the exercises, participants were educated about the training movements one week prior to the commencement of the study, with practical sessions arranged to facilitate proper technique acquisition. Participants were encouraged to lift their maximum weight for one repetition of each exercise, contingent on maintaining correct form.

Pre- and post-study measurements were taken of the participant's body composition and specific physical parameters. These measurements were conducted before the onset of the exercise regimen and after eight weeks. Participants were cautioned against consuming alcohol, drugs, or excessively fatty foods and from engaging in strenuous activities one day before the measurement tests. The study utilized the pretest-posttest model. Throughout the study period, participants were not subjected to any specific dietary program or restrictions.

Table 1. Functional Training Program Content

Program	Set	Time	Repetition	Rest
Plyo Push Up	3	30 sec.	-	1 min.
Swiss Ball Plank	3	30 sec.	-	1 min.
Dummbell Front Squat with Press	3	-	10	1 min.
Bent Over Row	3	-	10	1 min.
Deadlift	3	-	10	1 min.
Half Kneeling Pall of Press	3	-	10	1 min.

Anthropometric Measurements

Length Measurement

Length Assessment Length of participants was assessed in centimeters utilizing a Holtain

stadiometer (United Kingdom), which boasts a sensitivity of 0.01 m. Measurements were taken while participants maintained a vertical stance, barefoot, with feet adjoined, heads upright, and gazes forward, as outlined by Lukaski (2003).[12]

Body Weight and Body Mass Index Measurement

Body weight and Body Mass Index (BMI) was gauged via a Tanita MC780 scale (Japan) with an accuracy of ± 0.1 kg. This method, as detailed by Lukaski (2003), is premised on the differential lean tissue mass and electrical permeability of fat.[11] Weight measurements were taken in kg, with participants garbed in a t-shirt and shorts and standing in an anatomical position devoid of footwear. All measurements were conducted between 8:30 AM and 12:00 PM, subsequent to an overnight fast, with prerequisites including restroom use beforehand. Participants were instructed to maintain a vertical stance on the aluminum soles of the analysis device, barefoot, sans any metal or ornaments, and minimally clothed while holding the hand electrodes. The resulting data was logged with a laptop connected to the Tanita Body Composition Analyzer.

Physical Parameter Measurements

Sit and Reach Test bench featuring dimensions of 35 cm in length, 45 cm in width, and 32 cm in height was utilized to ascertain muscle flexibility. This test was performed thrice, with the optimal outcome being recorded as the absolute flexibility value.[13]

Standing Long Jump Test

This test was executed on a gymnastics mat, marked at 10 cm intervals from the commencement line, with the prerequisite that participants' feet did not touch this line. The participants began from an extended position with their feet together at the starting line. The furthest distance attained was measured, and this leap was replicated once more. The finest score procured was documented as the participant's standing long jump measurement.[13]

30 Second Push Up Test

Using a high-precision hand stopwatch, the 30-second push-up test was conducted. Upon initiation, participants were instructed to perform push-ups for 30 seconds. During this exercise, participants adopted a prone position with their bodies elevated from the ground through their toes and arms, while their knees remained rigid and their feet were not in contact with the ground. The total count of successful push-ups within the 30-second was recorded.[14]

One Minute Sit Up Test

The one-minute sit-up test required participants to begin supine, with knees bent at 90 degrees, hands clasped behind their necks, and feet in firm contact with the floor. Upon commencement, participants performed as many sit-ups as possible within one minute. An assistant held the participants' feet to maintain consistency to prevent them from lifting off the ground. The successful completion of a sit-up was determined by the participants' shoulders making contact with the ground when lying flat and their elbows touching their knees upon rising. The number of successful repetitions was noted.[15]

20 m Speed Test

The 20m sprint test was utilized to assess participants' sprint capabilities. A state-of-the-art Fusion Sport Smart Speed Digital Atmospheric system (Australia) equipped with photocell doors was used to gauge the sprint speed with an accuracy of 0.01 seconds. Before the test, participants warmed up with light sprint exercises for 5-10 minutes. The test began with participants standing one meter behind the starting line. Participants had two trials, with a rest interval of 3 minutes between each attempt. The best result was recorded.[16]

Balance Test (Flamingo Balance Test-FBT)

To evaluate the participants' static balance, the Flamingo Balance Test was used. Participants were instructed to stand on one leg (the dominant leg) on a wooden beam measuring 50 cm in length, 4 cm in height, and

3 cm in width. The other leg was bent at the knee and brought towards the hip, and held by the same side hand. While maintaining this one-legged balance, a one-minute timer was started. Any disruptions in balance, such as letting go of the foot, falling off the beam, or any part of the body touching the ground, paused the timer. After regaining their balance on the beam, the timer was resumed. The number of attempts to regain balance during the one minute was recorded as the participant's score.[17]

Statistical Analysis

The acquired data were statistically analyzed using the Windows SPSS 25.0 software package. The 'Paired Samples T Test' was employed to compare the subjects' data and determine the significance of the mean differences. A significance level of 0.05 was used in this analysis.

Ethical Aspect of Research

This article adheres to research and publication ethics principles, journal writing rules, and publication standards. Any potential ethical violations associated with this article rest solely with the authors. This study received ethics committee approval, numbered E-15604681-100-129234, from the Bayburt University Ethics Committee.

FINDINGS AND DISCUSSION

Table 2. Comparison of Body Weight, Values of Men Participating in the Study

Variables	Tests	X̄	Sd	p
Height (cm)		178.40	5.61	
Body Weight (kg)	Pre Test	86.56	1.33	0.00*
	Post Test	77.62	7.2	
Body Fat Percentage (%)	Pre Test	24.98	8.8	0.00*
	Post Test	17.62	6.51	
BMI (kg/m^2)	Pre Test	27.39	1.33	0.00*
	Post Test	24.56	7.2	

*; p<0.05

When Table 2 is examined, as a result of the statistical analyzes, the pre- and post-test values of the participants were respectively Body Weight, Body Fat Percentage, Body Mass Index, was observed that there was a statistically significant difference between the values.

Table 3. Students' Standing Jumping, Push-ups, Flexibility, Sit-ups, 20m sprint t-Test Results Before and After the Application

Variables	Tests	X̄	Sd	p
Standing Jump (m)	Pre Test	147.00	28.98	.00*
	Post Test	152.58	29.10	
30 sec Push Up (reps.)	Pre Test	11.43	5.36	.00*
	Post Test	15.13	5.49	
Flexibility (cm)	Pre Test	21.81	6.13	.00*
	Post Test	25.15	6.23	

Table 3 (Continued)

Variables	Tests	X̄	Sd	p
1 min Sit up	Pre-Test	14.05	5.17	.00*
	Post-Test	20.07	5.84	
20m Sprint (sec)	Pre-Test	3.95	.483	.00*
	Post-Test	3.67	.504	

*; p<0.05

According to the results of the t test; It was observed that there was a significant increase in the students' standing jump, push-up, flexibility, sit up, 20 m sprint results after the application (p<0.05).

Table 4. Balance t-Test Results of the Students Before and After the Application

Variables	Tests	X̄	Sd	p
Flamingo Balance Test (Right)	Pre Test	4.01	2.54	.00*
	Post Test	1.84	1.46	
Flamingo Balance Test (Left)	Pre Test	3.76	2.26	.00*
	Post Test	2.56	1.68	
Flamingo Balance Test	Pre Test	3.91	2.18	.00*
	Post Test	2.20	1.37	

*; p<0.05

According to the results of the t test; It was observed that there was a significant decrease in the balance right and balance left numbers of

the students after the application ($p<0.05$). These findings show that the application has a significant effect on the balance numbers of the students.

CONCLUSION AND RECOMMENDATIONS

As defined by Boyle (2004) and Shaikh and Mondal (2012), functional training is a specialized form of resistance training that improves various physical capabilities, including balance, stability, and strength, through multidimensional movements, thereby enhancing sports-related performance.[18,19] Integral benefits of this training paradigm encompass simultaneous stimulation of various bodily systems, enhancement of aerobic and anaerobic capacities, and improvement of body composition due to increased muscular endurance and strength.[20,21] Functional training typically comprises various movement patterns- such as pushing, pulling, throwing, squatting, jumping, and accelerating- sequenced in varying repetition cycles and interspersed with suitable rest intervals, elevating performance in routine tasks.[22] Therefore, it is optimal for functional training programs to mimic an individual's daily movements.[23]

Based on an eight-week functional training program, our research findings show marked improvements in participant body composition, standing jump, push-ups, sit-ups, flexibility, speed, and static balance. However, current scientific literature investigating the effects of functional training on fitness parameters is relatively scarce. A study by Dilber and Doğru (2018) subjected sedentary young adults to a twelve-week high-intensity functional training regimen, resulting in significant reductions in body fat percentage, albeit no statistically significant changes in body weight and BMI were recorded.[24] Similarly, Gregory et al. (2017) conducted a study involving a blend of a low-carbohydrate ketogenic diet and weekly CrossFit training over six weeks for 26 volunteers.[25] They noted a significant decline in BMI, body weight, and body fat percentage in the diet group compared to the control group. These findings substantiate our results. Heinrich et al. (2015) orchestrated a study involving participants aged 35 to 65 who underwent high-intensity functional training thrice a week for five weeks. The findings showed significant enhancements in lean body weight and reductions in body fat and fat percentage.[26] More recently, Kapsis et al. (2022) administered a twelve-week high-intensity functional training program to 31 participants, observing a significant reduction in body fat and an increase in lean body mass among the experimental groups, while the control group demonstrated no such changes.[27] These findings further align with our study and emphasize the need for continued research into the comprehensive benefits of functional training.

In their recent study, Xiao et al. (2023) involved a cohort of 40 young male tennis players with an average age of 16 years in order to evaluate the impact of functional training on strength and power parameters. The participants were evenly divided between a group undergoing functional training and a group adhering to traditional training methods. Following six weeks of the respective training regimens, both groups demonstrated a notable enhancement in their performance in standing long jumps and push-ups. These improvements were observed to be more pronounced as the 12-week mark approached.[28] In a previous study, Shaikh et al. (2012) focused on male university students. They posited that flexibility constitutes a significant aspect of physical fitness, which can be effectively improved with an eight-week functional training program, achieving up to a 23% increase.[19] This theme was further explored by Song et al. (2014), where a 16-week functional training program was administered to baseball players. The outcomes indicated that functional training had a positive effect on the strength and flexibility of the athletes.[29]

Similarly, Alonso-Fernández et al. (2017) reported substantial enhancements in the repeated sprint capacity of female handball players following an eight-week functional training regime.[30] Baron et al. (2020) carried out a study on young soccer players, identifying significant improvements in their acceleration (over 5-10 meters) and speed (over 10-30 meters) metrics after a 12-week training program.[31] More recently, Liao et al. (2022) determined that the performance values in flexibility and static push-ups for the experimental group were considerably higher than those of the control group, post a 12-week functional exercise regimen.[32] The findings from the studies above corroborate the outcomes of our research, strengthening the assertion of the beneficial impact of functional training on various aspects of athletic performance.

Usgu et al. (2020) did not observe any enhancement in horizontal jump performance following a 12-week functional training program among 28 professional basketball players. It is posited that this finding can be attributed to the distinct nature of basketball, which typically necessitates more vertical than horizontal jumping. However, the same study highlighted a significant improvement in flexibility and the results of a 20-meter sprint test in the functional exercise group. These improvements may derive from augmented muscular strength, improved coordination, and refined neural control, which would require prolonged training adaptation to harness the benefits of functional training fully. The importance of attaining a certain quality of movement pattern, which strongly correlates with force and power generation, was underscored.[33]

In a study comparing the effects of conventional resistance training and functional training, randomly assigned healthy volunteers aged between 18 and 32 into two equal groups. According to the findings from the pre-test and post-test administered at the end of the 7-week study period, there was a significant increase in push-up values in both groups. However, the traditional group exhibited a significant rise in abdominal strength, while the functional group saw a significant enhancement in flexibility. The findings were interpreted to suggest that both training programs are equally efficacious in augmenting endurance, balance, and conventional strength measures.[23]

Turna and Alp (2020) reported that there was no significant difference according to the pretest-posttest results in the right and left-hand grip strength, leg and back strength, 30 m sprint, and anaerobic power values in their study examining the effect of functional training on some biomotor abilities and physiological characteristics in elite football players.[34] Boztepe (2018) investigated the effect of functional training on athletic performance in young football players. The researcher reported no statistically significant difference in the pre-test results between the functional training group, the traditional training group and the control group. However, there were statistically significant differences in total score, speed, agility, right dynamic balance and left dynamic balance performance values regarding functional physical fitness gains.[35] Güler et al. (2021) investigated the effect of functional strength training on functional movement and balance. Forty-six healthy middle-aged individuals, 26 in the functional strength training group and 20 in the traditional strength training group, randomly participated in the study. After the 8-week program, the functional strength group tended to have significantly better balance control than the conventional strength group. It has been reported that functional strength exercises can reduce functional mobility inadequacies and fall risk in middle-aged individuals.[36] Erken et al. (2020) conducted a study with 60 volunteer participants (30 men and 30 women) who did not have a regular exercise routine to examine the effect of functional training on some physical performance parameters. Participants were randomly divided into experimental (15 female, 15 male) and control (15 female, 15 male). Participants in the experimental group were subjected to a functional training program lasting 45-60

minutes three days a week for eight weeks. According to the results of the study, statistically significant differences were determined between the pre-and post-test mean values in strength (leg and back), reaction time (visual, auditory, mixed), agility, dynamic balance, vertical jump, and flexibility performance of both male and female participants in the experimental group.[37]

Our study observed that the eight week functional training program created significant changes in all parameters examined. The changes in body composition may depend on the nutritional recommendations made to the participants about how they should be fed at the beginning of each week and not consume anything after 18:00, together with the functional training program applied. On the other hand, the improvements in the vertical jumping, push-ups, sit-ups, flexibility, sprint and static balance performances of the participants may depend on the effect of functional exercises on physical fitness parameters. The movement forms used in functional exercises can increase the physical fitness gains of paramedic students and their performance in their daily activities. It may be beneficial to include different occupational groups and larger samples in future studies and to app.

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