Turkish Journal of Sport and Exercise/
TürkSporveEgzersizDergisi
http://dergipark.gov.tr/tsed
Year: 2024 - Volume: 26- Issue 3 - Pages: 537-548
10.15314/tsed.1499134

Turkish Journal of Sport and Exercise
Türk Spor ve Egzersiz Dergisi
ISSN: 2147-5652
https://dergipark.org.tr/tr/pub/tsed

Examining the Effect of 3/7 Strength Training Method on Various Maximal Strength, Fatigue and Body Composition Parameters

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(Date Of Received): 10.06.2024 (Date of Acceptance19.08.2024 (Date of Publication): 31.12.2024
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Abstract

This study was conducted to examine the effectiveness of the 3/7 strength training method, a new strength training method, compared to the 4x6 strength training method. The research group consisted of a total of 32 volunteer participants. These participants were divided into 3/7 (n=11) and 4x6 (n=11) training groups and a control group (n=10) consisting of individuals who did not participate in any strength training program. Afterwards, people in the 3/7 and 4x6 strength training groups regularly performed strength training, which included the movements specified in the program, two days a week, with 48 hours of rest between training sessions, according to the determined program. Before the studies started and at the end of the studies, anthropometric data such as fat mass, lean mass, body weight, body fat percentage (BFP), body mass index (BMI) of the participants included in the study were measured and then, shoulder press (SP), bench press (BP) and squat (S) as maximal strength measurements; the number of repetitions in the BP, S and SP as the fatigue parameters were recorded. The data were analysed using SPSS 21.0 statistical package programme. Wilcoxon Signed Rank Test was used to compare the pre-test and post-test values within the groups and Mann-Whitney U Test was used to compare between the groups. According to the pre-test and post-test measurement data, significant differences were observed in all parameters of the participants who applied the 3/7 protocol. When the pre-post test measurement data of participants who applied the 4x6 protocol were examined, significant improvements were observed in all parameters except BMI and body weight measurements. Regarding the results of the control group, there was a significant difference due to the increase in fat mass, body weight, BFP

and BMI values, while a significance was also detected in BP and S measurements among the fatigue number of repetitions (FNR) values, and no significance was found in any of the remaining parameters. When the groups applying the 3/7 and 4x6 protocols were evaluated, participants applying the 3/7 protocol showed more significant improvements in the FNR-S measurement compared to the 4x6 training group , although there was no significant difference in all remaining values, it was observed that people in the 3/7 training group had better values. In conclusion, it was observed that the 8-week 3/7 protocol resulted in significant positive improvements in various body composition, fatigue and strength parameters of individuals.

Keywords: Maximal strength, strength training, fatigue, 3/7 method, body composition.

Özet

3/7 Kuvvet Antrenman Metodunun Çeşitli Maksimal Kuvvet, Yorgunluk ve Vücut Kompozisyonu Parametreleri Üzerine Etkisinin İncelenmesi

Bu çalışma, yeni bir kuvvet antrenmanı yöntemi olan 3/7 kuvvet antrenmanı yönteminin etkinliğini 4x6 kuvvet antrenmanı yöntemine kıyasla incelemek amacıyla yapılmıştır. Araştırma grubu toplam 32 gönüllü katılımcıdan oluşmuştur. Bu katılımcılar 3/7 (n=11) ve 4x6 (n=11) antrenman grupları ile herhangi bir kuvvet antrenman programına katılmayan bireylerden oluşan kontrol grubu (n=10) olarak ayrılmıştır. Sonrasında 3/7 ve 4x6 kuvvet antrenman gruplarındaki kişiler belirlenen programa göre haftada iki gün ve antrenman seanslarının olduğu günler arasında 48 saat dinlenme olacak şekilde programdaki belirtilen hareketleri içeren kuvvet antrenmanını düzenli olarak uygulamışlardır. Çalışmaya dahil olan katılımcılardan çalışmalar başlamadan önce ve çalışmaların bitiminde; yağ kütlesi, yağsız kütle, vücut ağırlığı, vücut yağ yüzdesi (VYY), vücut kütle indeksi (VKİ) gibi antropometrik veriler alınmış ve ardından maksimal kuvvet ölçümü olarak shoulder press (SP), bench press (BP) ve squat (S); yorgunluk parametresi için ise BP, S ve SP egzersizlerindeki tekrar sayıları alınarak kaydedilmiştir. Veriler SPSS 21.0 istatistik paket programı kullanılarak analiz edilmiştir. Grup içi ön-test ve son-test değerlerinin karşılaştırılmasında Wilcoxon İşaretli Sıralar Testi, gruplar arası karşılaştırmalarda ise Mann-Whitney U Testi kullanılmıştır. Ön test ve son test ölçüm verilerine göre 3/7 protokolünü uygulayan katılımcıların tüm parametrelerinde anlamlı farklılıklar gözlenmiştir. 4x6 protokolünü uygulayan bireylerin ön-son test ölçüm verilerine bakıldığında ise VKİ ve vücut ağırlığı ölçümleri dışındaki bütün parametrelerde anlamlı düzeyde gelişmeler görülmüştür. Kontrol grubu sonuçlarına bakıldığında yağ kütlesi, vücut ağırlığı VYY, VKİ değerlerindeki artıştan dolayı anlamlı farklılık bulunurken, yorgunluk tekrar sayısı (YTS) değerlerinden BP ve S ölçümlerinde de anlamlılık tespit edilmiş olup, kalan hiçbir parametrede anlamlılığa rastlanmamıştır. 3/7 ile 4x6 protokolünü uygulayan gruplar değerlendirildiğinde ise YTS-S ölçümünde 3/7 protokolünü uygulayan katılımcılar 4x6 antrenman grubuna kıyasla daha anlamlı gelişmeler gösterirken, geriye kalan tüm değerlerde anlamlı farklılığa rastlanmasa da 3/7 antrenman grubundaki kişilerin daha iyi değerlere sahip olduğu saptanmıştır. Sonuç olarak; gerçekleştirilen 8 haftalık 3/7 protokolünün bireylerin çeşitli vücut kompozisyonu, yorgunluk ve kuvvet parametreleri üzerinde olumlu düzeyde önemli gelişmelere neden olduğu gözlenmiştir.

Anahtar Kelimeler: Maksimal kuvvet, kuvvet antrenmanı, yorgunluk, 3/7 yöntemi, vücut kompozisyonu.

INTRODUCTION

Exercise activities are loved and encouraged by people of all ages and levels due to the benefits they provide for people. Individuals participate in these activities for many reasons, such as preventing or reducing various diseases, enjoyment, improving the quality of life and athletic performance. Although some people are cautious about exercise activities due to reasons such as injury (25), today's technological developments, studies and experienced trainers can eliminate these concerns and exercise programs can be adapted to people of all ages and levels (10). While carrying out sports activities, it is very important to implement these activities in an organized manner. In this case, the term training comes to the fore. Training is defined as activities in which the development of individuals is monitored in a pedagogically and systematically planned manner (1).

Muscle strength is called the ability of muscles to contract and resist this resistance when they encounter any resistance (23). Considering the strength needs of individuals in their daily lives, whether they are athletes or not, it is very important to improve the strength parameter. Because strength is a feature that is required not only in areas where strength parameters are needed, but also where important components such as speed and endurance are required and in order to reveal these parameters appropriately; it is a necessary component also for sedentary individuals to live a better-quality life. Ivey et al. (10) revealed in a study they conducted that regular strength training had positive effects on people's hypertrophy and muscle strength, regardless of age and gender. The mentioned effects have caused this concept to be the subject of many studies. Strength training is a type of training performed at certain intensities against any resistance. It can be applied for various purposes such as general well-being, reducing body fat percentage, increasing muscle cross-sectional area, and providing the physical skills required for military training and becoming a firefighter (3). When organizing strength training, components such as intensity, volume, duration, intensity, rest, movement tempo and frequency should be appropriately adjusted and applied for the purpose to be achieved (13). Although rest periods are not given much importance compared to other components, they are very important as they directly affect performance and exercise efficiency (14). In some studies, supporting this view, it has been reported that short rest intervals are more effective on the cross-sectional area of the muscles compared to long rest intervals (4,7).

The 3/7 training protocol is a strength training method that aims to increase metabolic stress, which is an important issue especially for short rest intervals and strength gains. This protocol consists of performing the exercises with medium-high intensity loads (≥ 70%), 3-4-5-6-7 repetitions, 5 sets and very short rest periods (≥ 15 seconds). The 3/7 protocol is quite different, especially in terms of total training time (≥ 5 minutes) (14). Stragier et al. (24) suggested that elbow flexion training using the 3/7 protocol was a more effective method on the participants' maximal strength, fatigue and hypertrophy parameters compared to the 8×6 method. In another study, it is claimed that the 3/7 protocol used in the bench press exercise causes better improvements in the participants' maximal strength values compared to the 4×6 method. When the studies are examined, it is seen that this method is an effective method in terms of developing maximal strength. It is also emphasized that this method may create more metabolic stress compared to methods with similar volume and intensity but longer rest periods (14).

At present, many strength training methods are used around the world. However, people's increasing strength needs for various reasons in their normal lives, limited time, health problems such as injuries and the inadequacy of traditional methods requires the need for different methods. As a result of the observations made during the research, it is seen that the 3/7 protocol was completed in much shorter times without compromising the gains obtained. It is thought that this situation further increases the importance of our research, especially in this period when time is limited and rapid performance development is much more necessary. When similar studies are examined, it is seen that more studies are needed on the effectiveness of this method on maximal strength, fatigue and body composition values in basic movements such as squat, shoulder press and bench press. For this reason, the aim of the study was to examine the effectiveness of this new method (the 3/7 method) on maximal strength, fatigue and various body composition values in different movements.

METHOD

Research Model

In this study, the pre-post test control group model, one of the experimental methods, was used.

Research Group

The research was carried out in Çankırı province. 32 sedentary people, aged between 16 and 22, who had no health risks in participating in exercise programs and who had not practiced strength training in the last 6 months, were included in the study on a voluntary basis. Volunteer participants

were divided into three groups: 3/7 (n=11) and 4x6 (n=11) training group and control group (n=10). The exercise program was completed by the participants without any problems.

Data Collection Tools

Measurements taken from the participants were taken twice, before starting the study and at the end of the study. Participants over the age of 18 themselves, and participants who were under the age of 18 themselves and their parents were asked to sign informed consent forms. Before starting the exercise program, adaptation training was carried out 2 days a week for 2 weeks to prevent injuries and to perform the exercise forms properly.

Height

A SECA brand stadiometer was used to measure the height of the individuals. Participants were asked to have their bodies upright and their feet bare.

Body Composition

Fat mass, body weight, BFP, fat-free mass and BMI measurements used in the research were performed using the Tanita-MC 580 brand bioelectric impedance analyzer. Necessary warnings were given to people not to consume any food or engage in exercise before the measurement.

1 Repetition Maximum (1RM) Strength

In the study, 1RM values of individuals in shoulder press (SP), bench press (BP) and squat (S) movements were used. Since classical maximal force determination methods will increase the risk of injury in people who have not done strength exercises before, it is stated that it is more appropriate to use maximum force estimation equations in these individuals (9). Therefore, the Brzycki formula was used when determining the maximal strength of individuals in the study. After the participants warmed up with low weights for 10 minutes, they performed the exercises with weights that would not cause any deterioration in the form of the exercises. If the subjects exceeded 10 repetitions with the weights they chose, they were asked to stop and after resting, they added some more weight and performed the exercises again. Participants were stopped when they performed 10 repetitions or less in the exercises, and the weight they lifted and the number of repetitions they completed were entered into the formula. Considering the research, it has been suggested that in maximum force prediction equations performed with submaximal weights, the predictive power of the equations is stronger when the number of repetitions in the movements is ≤10 (19). Brzycki formula; 1RM = Weight Lifted / [1.0278 – (0.0278 x Number of Reps)] (5).

Fatigue Number of Repetitions (FNR)

Fatigue number of repetitions measurements in SP, S and BP movements were used in the research. While these measurements were being made, the participants included in the study were asked to perform as many repetitions as they could in all movements with weights corresponding to 70% of their previously calculated maximum strength (24). Importance was given to performing the movements with the correct form; when the movements were not performed with the appropriate technique, the measurement was terminated, and the last number of repetitions performed with the correct form was recorded.

Strength Training Programs Applied

Both training methods were applied two days a week for 8 weeks and 48 hours were left between training sessions. Participants performed a warm-up period consisting of 3 sets and the movements performed in the study, before starting the training throughout the study; 1 set of 10 repetitions, 1 set of 8 repetitions, 1 set of 6 repetitions were performed with 30%-40%-50% of 1RM, respectively. In the 3/7 strength training method, individuals perform 5 sets and 3-4-5-6-7 repetitions respectively with 70%

of their maximum strength. Participants rest for 15 seconds between sets (24). Although the 4x6 strength training method is a more traditional method, in this method participants still perform movements with 70% of their maximum strength in 4 sets and 6 repetitions in each set. Individuals rest for 150 seconds between sets (14).

The participants included in the study were helped, at least in a small way, when they had difficulty in reaching the required number of repetitions. When people practiced each movement without support for two consecutive workouts, the loads were increased by at least 2.5 kg. While the participants were performing the movements, care was taken to ensure that their tempo was at a moderate level and that the final test measurements were made 48-72 hours after the last training session, at the same time as the pre-training measurements (14). The 8-week training program was terminated without any adverse events.

Analysis of Data

The data obtained in this study were analyzed using the SPSS 21.0 statistical software program. As a result of the analyses, the data were evaluated by calculating the arithmetic mean and standard deviation values. When the data was examined, it was determined that it did not show a normal distribution and therefore non-parametric tests were preferred in the study. The Wilcoxon Signed Rank Test was used to compare the pre-post test results of the groups. The Mann-Whitney U Test was preferred to compare the groups with each other.

Effect size (r) results were obtained by dividing the Z value obtained by the Wilcoxon Signed Rank Test by the square root of the sum of the people participating in the measurements in the groups ($Z/\sqrt{n}$). The effect size results resulting from the calculation were analyzed according to Cohen's classification (0.1 low effect - 0.3 medium effect - 0.5 and above high effect) (18). In the study, the statistical significance level was accepted as $p<0.05$.

Ethical approval and institutional permission

Ethics committee approval for the study was received by Karabük University Social and Human Sciences Research Ethics Committee. (Meeting No: 2021/02).

FINDINGS

Table 1. Demographic İnformation of The Participants

	Group	N	$\bar{X}$	SD
Age (years)	3/7	11	17,90	2,165
	4x6	11	17,72	1,272
	control	10	17,70	1,888
Height (cm)	3/7	11	166,00	11,991
	4x6	11	166,45	9,437
	control	10	164,70	10,499
Body weight (kg)	3/7	11	63,90	14,239
	4x6	11	67,77	15,448
	control	10	62,01	12,421
BMI	3/7	11	23,15	4,882
	4x6	11	24,40	5,456
	control	10	22,71	2,800

The average body weight, age, BMI and height of the people included in the study are presented in Table 1.

Table 2. Comparison of Pre-Post Test Data of The Training Group Applying The 3/7 Protocol

	Pre-Test			Post-Test			% Change	r	Z	p
	N	X̄	SD	N	X̄	SD				
Body Weight (kg)	11	63,90	14,239	11	62,20	12,067	-2,66	0,436	-2,046	0,041*
BMI	11	23,15	4,882	11	22,57	4,165	-2,50	0,424	-1,989	0,047*
Fat Mass (kg)	11	16,59	9,510	11	14,03	7,783	-15,43	0,625	-2,936	0,003*
BFP (%)	11	24,70	10,701	11	21,81	9,899	-11,70	0,625	-2,934	0,003*
Lean Mass (kg)	11	47,31	8,889	11	48,15	8,913	1,77	0,569	-2,673	0,008*
1RM-S (kg)	11	40,71	22,240	11	96,74	35,158	137,63	0,625	-2,934	0,003*
1RM-BP (kg)	11	27,09	7,774	11	36,37	8,314	34,25	0,625	-2,934	0,003*
1RM-SP (kg)	11	17,33	4,923	11	28,81	8,693	66,24	0,626	-2,937	0,003*
S-FNR	11	22,72	7,551	11	64,63	13,071	184,46	0,625	-2,934	0,003*
BP-FNR	11	13,45	3,266	11	27,27	6,482	102,75	0,625	-2,936	0,003*
SP-FNR	11	13,27	2,796	11	28,45	7,434	114,39	0,625	-2,934	0,003*

*p<0,05, r= Effect Size, S= Squat, BP= Bench Press, SP= Shoulder Press, FNR= Fatigue Number of Repetitions, RM= Maximal Repetition

When Table 2, which compares the pre-tests and post-tests of the participants who applied the 3/7 protocol, is examined; there are significant differences in all parameters (p<0.05).

As a result of the 8-week training period, high effect size values were detected in lean mass, fat mass and BFP measurements. While the parameters S, BP and SP among the 1RM values, and SP, S, BP among the FNR values have high effect size results, BMI and body weight have medium effect size values. No value with a low effect size could be detected.

Table 3. Comparison of Pre-Post Test Data of The 4x6 Strength Training Group

	Pre-Test			Post-Test			% Change	r	Z	p
	N	X̄	SD	N	X̄	SD				
Body Weight (kg)	11	67,77	15,448	11	67,43	15,243	-0,50	0,132	-0,623	0,533
BMI	11	24,40	5,456	11	24,30	5,482	-0,40	0,114	-0,535	0,593
Fat Mass (kg)	11	18,53	9,018	11	17,39	9,551	-6,15	0,493	-2,314	0,021*
BFP (%)	11	26,36	8,608	11	24,60	9,016	-6,67	0,575	-2,701	0,007*
Lean Mass (kg)	11	49,24	9,565	11	50,13	8,719	1,80	0,369	-1,735	0,083
1RM-S (kg)	11	39,59	17,599	11	83,54	27,374	111,01	0,625	-2,934	0,003*
1RM-BP (kg)	11	28,12	9,960	11	35,40	11,038	25,88	0,625	-2,936	0,003*
1RM-SP (kg)	11	17,63	6,064	11	26,97	8,959	52,97	0,625	-2,936	0,003*
S-FNR	11	20,81	9,516	11	49,45	18,726	137,62	0,598	-2,805	0,005*
BP-FNR	11	14,36	2,838	11	24,27	7,001	69,01	0,626	-2,938	0,003*
SP-FNR	11	14,45	4,131	11	26,90	6,876	86,15	0,626	-2,937	0,003*

*p<0,05, r= Effect Size, S= Squat, BP= Bench Press, SP= Shoulder Press, FNR= Fatigue Number of Repetitions, RM= Maximal Repetition

When the pre-post test measurements of the participants in the 4x6 strength training group in Table 3 are examined; significance was detected in BFP, fat mass, SP, S and BP measurements among

the 1RM values, and in SP, S and BP measurements in FNR values. No significance was detected in lean mass, body weight and BMI measurements.

The effect size results at the end of the study period shows that while BFP, SP, S, BP among the 1TM values and SP, S, BP among the FNR values have high effect size values, lean mass and fat mass have medium effect size values, and BMI and body weight measurements have low effect size values.

Table 4. Comparison of The Control Group Pre-Post Test Values

	Pre-Test			Post-Test			% Change	r	Z	p
	N	$\bar{X}$	SD	N	$\bar{X}$	SD				
Body Weight (kg)	10	62,01	12,421	10	62,94	11,683	1,49	0,467	-2,193	0,028*
BMI	10	22,71	2,800	10	23,01	2,483	1,32	0,449	-2,109	0,035*
Fat Mass (kg)	10	12,49	4,817	10	13,28	4,128	6,32	0,467	-2,193	0,028*
BFP (%)	10	20,25	6,600	10	21,39	6,257	5,62	0,467	-2,194	0,028*
Lean Mass (kg)	10	49,54	11,004	10	49,70	10,926	0,32	0,261	-1,228	0,219
1RM-S(kg)	10	38,20	10,809	10	37,15	9,540	-2,74	0,184	-0,866	0,386
1RM-BP (kg)	10	26,58	8,322	10	26,01	8,156	-2,14	0,227	-1,068	0,285
1RM-SP (kg)	10	17,17	3,452	10	18,84	4,710	9,72	0,380	-1,785	0,074
S-FNR	10	18,40	4,647	10	20,00	5,849	8,69	0,438	-2,056	0,040*
BP-FNR	10	13,20	1,873	10	14,30	1,888	8,33	0,492	-2,309	0,021*
SP-FNR	10	14,50	3,135	10	14,40	3,747	-0,68	0,053	-0,250	0,803

*p<0,05, r= Effect Size, S= Squat, BP= Bench Press, SP= Shoulder Press, FNR= Fatigue Number of Repetitions, RM= Maximal Repetition

Examining the Table 4, among the pre-post test measurements of the participants in the control group; while there was no significant difference in fat-free mass, SP, S and BP among the 1RM values, and SP among the FNR values ($p>0.05$), significant differences were observed as there were increases in fat mass, body weight, BFP, BMI and S and BP among the FNR values ($p <0.05$).

When the effect size values at the end of the 8-week training period were examined, no high effect size values were observed in the participants in the control group. BFP, body weight, fat mass, BMI and SP among the 1RM values, BP and S among the FNR values had medium effect size values. A low effect was observed in lean mass, BP and S among the 1TM values, and SP among the FNR values.

Table 5. Comparison of Post-Tests of Participants Applying The 3/7 and 4x6 Protocols

	Group	N	$\bar{X}$	SD	Z	p
Body Weight (kg)	3/7	11	62,20	12,067	-0,723	0,470
	4x6	11	67,43	15,243		
BMI	3/7	11	22,57	4,165	-0,854	0,393
	4x6	11	24,30	5,482		
Fat Mass (kg)	3/7	11	14,03	7,783	-0,689	0,491
	4x6	11	17,39	9,551		
BFP (%)	3/7	11	21,81	9,899	-0,689	0,491
	4x6	11	24,60	9,016		
Lean Mass (kg)	3/7	11	48,15	8,913	-0,624	0,533
	4x6	11	50,13	8,719		
1RM-S (kg)	3/7	11	96,74	35,158	-0,625	0,532
	4x6	11	83,54	27,374		
1RM-BP (kg)	3/7	11	36,37	8,314	-0,165	0,869
	4x6	11	34,40	11,038		
1RM-SP (kg)	3/7	11	28,81	8,693	-0,362	0,717
	4x6	11	26,97	8,959		
S-FNR	3/7	11	64,63	13,071	-1,974	0,048*
	4x6	11	49,45	18,726		
BP-FNR	3/7	11	27,27	6,482	-1,417	0,156
	4x6	11	24,27	7,001		
SP-FNR	3/7	11	28,45	7,434	-0,462	0,644
	4x6	11	26,90	6,876		

*p<0,05, S= Squat, BP= Bench Press, SP= Shoulder Press, FNR= Fatigue Number of Repetitions, RM= Maximal Repetition

On the table 5, where the post-test measurements of the training groups are compared, no significance was found in lean mass, BMI, body weight, BFP, fat mass, S, SP and BP among the 1RM values, and SP and BP among the FNR values. In the S-FNR measurement, a significance was observed in favor of the participants in the group applying the 3/7 protocol ($p < 0.05$).

DISCUSSION AND CONCLUSION

The research was carried out to investigate the effectiveness of the 3/7 strength training method, which is a newer training method compared to traditional training methods, by comparing it with the 4x6 strength training method, which is one of the traditional methods. The study included 32 participants aged between 16-22, who volunteered to participate in the study and did not have any health problems. Those who met the criteria for participation in the study were divided into 3 groups: 4x6 and 3/7 strength training groups and the control group, and the values measured as a result of the applied strength training were compared statistically. The findings obtained as a result of the analyzes were examined by scanning the literature.

When the body composition values of the participants in all groups in the current study were examined; significant differences were observed in BMI, BFP, lean mass, fat mass and body weight measurements compared to the pre-test measurements of the post-test measurements of the people in the 3/7 training group. Based on the findings of the study, it was determined that the 3/7 training method applied regularly for eight weeks had positive effects on all body composition measurements of the participants. In the 4x6 strength training group, a significant improvement was observed in BFP, lean mass and fat mass values. There was a significant difference in BMI, body weight, lean mass and fat

mass values in the participants in the control group. However, as can be seen from the percentage change values, this difference is due to the increase in these values. The reason for this may be that they were inactive due to the epidemic during the eight-week training period and that they lived a sedentary life because they were affected by this process. When the effect size values of the study were examined, it was seen that the participants in the 3/7 strength training group showed high effect values in more variables compared to those in the other two groups.

When the literature was examined, no study was found examining the effectiveness of the 3/7 strength training method on body composition measurements in sedentary individuals between the ages of 16-22. For these reasons, the studies whose analysis results are given below also included studies in different age groups and using different strength training methods.

Perez-Gomez et al. (20) stated in their study that the strength training they applied for 10 weeks did not have any significant effect on the participants' BFP, BMI and fat mass values, and that there were statistically significant increases in their lean mass values. Lo et al. (17) divided 30 male students into 3 groups, namely endurance, strength, and control groups, and conducted a study for 24 weeks, showing that no significant difference was observed between the groups in BMI, BFP, fat mass and body weight values, and similarly, they stated that the lean mass values of the participants in the strength training group increased significantly compared to those in the other groups. In a different study, similar to the study in question, individuals who had not participated in any strength training program for the last 5 months performed exercises for different muscle groups. It was stated that at the end of the training period, the participants did not show significant improvements in any body composition values, and the protocol applied only had a low effect on lean mass, muscle mass and fat mass values (15). Similar to the study conducted in middle-aged men, it was found that as a result of 16-week strength training for large muscle groups with increasing intensity every 4 weeks, although the body weight values of the participants decreased, no significance was found, but significant decreases were observed in BFP values (11).

When the findings and results of the studies conducted in the literature are compared with the results of the study conducted to investigate the effectiveness of the 3/7 strength training method, it is seen that although there are different studies, they support the results of the conducted studies, while some studies in the literature, on the other hand, do not have similar results. The reasons for this may be differences in exercise programs, strength training methods applied, training duration, and gender and age of the participants. Considering the results obtained in the researched and above-mentioned studies, it is seen that strength training methods, including the 3/7 strength training method, positively affect body composition parameters.

When the maximum strength measurements of the participants in the groups before and after the training were examined; it was determined that there were significant increases in all maximal strength measurements of people in the 4x6 and 3/7 training groups. Based on these results, it is determined that both training methods cause significant improvements in all maximum strength values of the participants. However, in the control group, no significant difference was found in maximal strength measurements at the end of the study.

When looking at the maximum strength values of the groups; It was observed that the 3/7 and 4x6 strength training groups showed a significant increase in strength compared to the control group in all maximal strength measurements at the end of 8-week training. When the training groups were compared, although there was no significant difference in the maximum strength values, it was observed that the individuals in the 3/7 training group had much better values in all maximal strength measurements compared to the participants in the 4x6 training group. Considering the effect size (r) values, it was determined that the effect values were high in all pre- and post-test comparisons of the 4x6 and 3/7 training groups, while no high effect value was observed in any variable in the control group.

When we look at the studies in the literature, in another study, similar to the current study where the 3/7 strength training method was examined, 38 people between the ages of 18 and 26 who had never applied any strength training program before were divided into 3 groups: 4x6, 8x6 and 3/7 strength

training groups. During training, individuals applied the bench press (BP) movement with loads corresponding to 70% of their maximal strength. At the end of the study, while significant increases were detected in the BP values of the participants in all training groups, similar to our research, it was stated that this increase was more pronounced in the 3/7 training group (14). Similarly, Stragier et al. (24) in their study examining the 3/7 training method, they divided a total of 30 people between the ages of 18 and 32, who had not implemented any strength training program in the 6 months before participating in the study, into 3/7 and 8x6 strength training groups. During the study, participants performed elbow flexion exercises with 70% of their maximum strength 2 days a week for 12 weeks. Considering the study results, it is reported that although there were significant increases in the elbow flexion movement measurements of the participants in both training groups, similar to our study and the previous study mentioned above, this increase was greater in the participants in the 3/7 training group, both as a percentage change value and as a maximal strength value. The findings obtained from the two studies mentioned above, which are similar to our research, support the findings we put forward in our study. In a study examining the effectiveness of different numbers of sets on maximal strength, participants performed various lower body and upper body exercises of 8-12RM, divided into groups as 1 set, 3 sets and 5 sets, for 24 weeks. Considering the study results, it was reported that significant improvements were observed in the maximal strengths of the three groups in the exercises (21). Kim et al. (12) examined the effectiveness of traditional and super slow training methods on maximal strength in their study. In the study, participants were made to perform various exercises that activated the chest, shoulder and leg muscles, with loads corresponding to 50-80% of their maximal strength, similar to our research. As a result of the measurements made at the end of the training period, significant increases were observed in the maximal strength of the participants in both training groups. When the studies are examined, most of the studies have similar results to our study. Considering the findings we obtained in the study and the studies in the literature mentioned above, it is seen that the 3/7 strength training method and other training methods applied, whose effectiveness we examined, positively affect the maximum strength values of individuals.

When the fatigue repetition numbers (FRN) in the study are examined, it is seen that there were significant increases in the FRN values of the participants in both training groups. Although the FRN squat (S) value was significant among the training groups, it was determined that individuals in the 3/7 training method showed higher repetition increases in all other values, including percentage change values, compared to individuals in the 4x6 training method. In addition, when the effect size values were examined, while both training groups had high effect values, no high effect values were found in any measurement in the control group.

In the study examining the 3/7 training method, that we examined in our study, participants had the elbow flexion exercise performed with 70% of their maximum strength for 12 weeks. While significant increases in FRN values were detected in both training methods used in the study at the end of the training period, when the training groups were compared, it was revealed that the participants who applied the 3/7 method showed better development compared to the 4x6 training group (24). In a different study investigating the effects of different training frequencies on individuals' performance, 39 healthy participants who did not regularly apply a strength exercise program were included and various lower body and upper body exercises were performed at different frequencies for 8 weeks with increasing intensities every two weeks. In order to determine the FRN values of the participants, they were asked to perform as many repetitions as they could in the selected movements before and after the training, with 60% of their pre-test maximum strength. At the end of the 8-week exercises, it was reported that all groups except the control group showed significant improvements in the FRN values in the selected exercises (2). Chulvi-Medrano et al. (6) in their study conducted with 20 healthy participants who were recreationally interested in sports, they had the participants perform BP and lat pull down movements according to manual strength training and traditional strength training principles. Participants were asked to repeat push-ups and pull-ups as many times as they could before and after the training. At the end of the study, it was stated that while the FRN values of the participants in both training groups increased, this increase did not cause any significance. While most of the studies

examined are parallel to our research, the study of Chulvi-Medrano et al. does not support our research results. This may be due to the application of different training programs, intensity of exercises and rest periods.

This study was limited to 8 weeks and the criterion of not having participated in any strength training programme in the last 6 months was sought in the participants included in the study. In addition, the variables examined in the study were limited to 1RM, fatigue number of repetitions and various body composition values.

In conclusion, both strength training methods, performed regularly for 8 weeks, resulted in significant improvements in participants' various maximum strength, fatigue and body composition parameters. When we compare the training methods between themselves, it is seen that although the two methods caused improvements in the mentioned parameters, the participants in the group applying the 3/7 protocol showed better development in these parameters. One of the important advantages of the 3/7 training method is that the exercises are performed in less than 5 minutes, which is especially important for people who have time constraints to exercise. In addition, this method can be very important in situations such as easy inclusion in exercise sessions to train specific muscle groups and in cases where there is little time allocated to physical fitness.

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