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RESEARCH ARTICLE

Progressive Upper Compartment Functional Strength Training on Postural Muscle Force: In Volleyball Players

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Abstract

Objectives: Postural muscle force leads to a increase in functional movement and associated ability of strength. The author examined changes in shoulder and humerus strength, maximum isometric joint angular degree force after functional upper strength training in volleyball players. They evaluated isometric joint angular force degree as predictors of functional strength.

Materials and methods: Twenty four participant (average to 19.03 ± 1.54 age) were randomized to a 4-wk upper compartment functional strength program or control group.

Results: Functional strength group increased significantly ($p < 0.05$) for all angular strength. Compared with controls, to functional strength led to greater at 45° angular strength ($p = 0.011$) dominant hand, non-dominant hand angular strength ($p = 0.001$), greater 90° angular strength ($p = 0.014$) dominant hand, non-dominant hand angular strength ($p = 0.001$). Shoulder and humerus muscle-tendon isometric strength were good predictors of functional strength.

Conclusion: The authors concluded functional strength training in strength development is a important factor for shoulder-humerus postural force and a key target for upper compartment functional interventions.

Keywords

Functional strength training, Shoulder-humerus postural muscle force, Volleyball players

Introduction

Volleyball players, there are angular differences in postural muscle strength of the technical movement such as lifting, lowering and muscle balance [1]. Addition, volleyball players perform individual strength in upper compartment muscle-tendon dynamics and endurance abilities, and are variant in different strength/power training such as power, stretch-shortening cycle, and movement speed [2]. However, humerus and shoulder strength performance may decrease or increase in a periodic sequences during functional training for postural muscle force development [3]. Both injury and syndrome in which mechanical strength deficiency occurs in overactive shoulder-humerus muscle groups of the upper compartment during competition and training periods are experienced [4]. Therefore, it was necessary to progressive functional muscle strength exercises for shoulder and humerus muscle tendon complex strengthening angular activity in the training into postural muscle weakness [5].

Force energy generations in locomotive shoulder activity and their planing to provide rotational flexibility of movement are frequently mentioned in the literature [6]. However, the reason why functional training is applied in the upper compartment is to provide potential muscle mass increases and strengthening in appropriate movements in athlete [7]. On the contrary, improper functional strength training in lengthening ability of postural muscle or decrease of strength in different shoulder areas such as anterior, posterior, laterals with abnormality strength and muscle force [8]. Therefore, even in a single power cycle, a complex loss of the strength is observed overactive and protractive muscle in generally cervical region that is, when muscle-tendon weakening is seen in postural evaluations, injury is high during explosive force periods [9]. Correct force created in multiple joints in postural muscle structure caused the posterior muscles to overactive, in fact the

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Table 1: Funtional strength training program.

Weeks	1-wk			2-wk		
Functional training	**Shoulder pulling**	**Latpull down high degree**	**Dumbbell broad**	**Bench press**	**Shoulder extension with bar**	**Shoulder triceps brachii machine**
Intensity session	85%	90%	85%	95%	95%	90-95%
Repetition	12 rep	10 rep	12 rep	12 rep	8 rep	12 rep
Set	5 set	5 set	3 set	5 set	3 set	2 set
Total repetition	34			32		
Weeks	3-wk			4-wk		
Functional training	**Prone triceps shoulder extension lunge**	**Latpull down low degree**	**Cable row crossover**	**Fly pulling machine**	**Ultimate cable shoulder workout**	**Cable row pulling**
Intensity session	95%	85%	95%	90-95%	90%	95%
Repetition	15 rep	10 rep	8 rep	5 rep	5 rep	10 rep
Set	1 set	3 set	5 set	3 set	3 set	5 set
Total repetition	33			20		

muscle-tendon complex advanced in the lateral muscles [10]. There not corrective functional exercises in unbalanced muscle strength in the upper compartment [11]. It is no separated and is an index region in the postural strength mechanism at the same time and is correct useful to evaluate the isometric muscle force, weakness, and stiffness of shoulder area on digital and dynamometer hand platforms during intense training in volleyball players [12].

A previous study, shoulder-humerus postural muscle strength performance is revealed by isometric muscle contraction modeling of myofascial tendon tension and irregular localized loss of function and strength in shoulder stability, humerus head glenoid fossa tension is obtained from superior shoulder capsule connection, deltoid posterior, and supraspinatus that over time, unstable muscle shortening is known as crossover syndromes [3,8,13]. This is due to the stability of the deep shoulder muscles in the cervical junction complex and different motion stages, usually in the shoulder and humerus elevation ranges [13]. Morover, forward head posture, rounded shoulder, myofascial seperation, and pain due to deep cervical shoulder and upper cervical hyperextension are associated with weakness and shorthening [4,10,14].

Other previous studies, different exercise models were obtained to evaluate functional postural dynamics in the posterior-lateral shoulder region of physical active, bodybuilding and powerlifting athletes in the upper compartment postural structure strength [11,15]. Similarly study, to evaluate strength asymmetry of shoulder in different volleyball players were obtained internal rotator injury and deficient [1,5].

The aim of this study is to examine muscle strength in different upper compartment of volleyball players. Concequence of function training will be concluded whether there is weakness in the postural muscles upper compartment angular region dynamic will be analyzed in postural evaluation.

Materıals and Methods

Participation

Twenty-four women were created sample group and a randomized control trial in this study. First group; functional strength training group volleyball players (FST: 12 sample size 18.59 ± 2.41 years-old, 65.20 ± 4.20 kilograms, 1.79 ± 3.54 m height, training experience 6.43 ± 3.58 years) participated in performing 4-wk functional strength training in an upper compartment. Second group; an physical active non-control group (CON: 12 sample size 19.48 ± 1.63 years-old, 69.42 ± 3.58 kilograms, 1.74 ± 2.47 m height, training experience 3.84 ± 2.45 years) voluntary participated in this study (Table 1). Participants signed an informed consent form prior to this study by Decleration of Helsinki in sport field.

Upper compartment shoulder junction postural muscle movement analysis

Postural muscle activity analysis evaluation including a shoulder junction muscles during active phases. Active flexion of shoulder abduction initial is 180° degree between scapulae raising in supine position. Stabilize scapulae passivelly in horizontal abduction from 90° degree extended elbow applied shoulder abduction 40-45° degree raising in prone position [16]. Resistance executed after manipulate. Therefore, obtained type I-III phase inactivity muscle and IV-V phase active muscle. Typical evaluation showed active muscle phases within 30 min in upper crossed regions. Ultimately, in muscle

Table 2: FST group upper strength angular degree results.

Strength Variables	FST group					
	Pre test	Post test	P-values	95% CI	Standardize ES	Cohen' d ES
45° Dominant	27.15 ± 2.38	30.05 ± 2.44	0.001***	4.26-1.53	2.14	1.20
45° Non-dominant	23.65 ± 2.08	25.47 ± 2.42	0.002**	2.90-0.71	1.71	0.80
90° Dominant	20.28 ± 2.88	24.00 ± 2.35	0.001***	4.49-2.95	1.21	1.41
90° Non-dominant	18.77 ± 2.23	19.50 ± 1.93	0.044*	1.57-0.12	1.33	0.35

*p < 0.05; **p < 0.010; ***p < 0.001

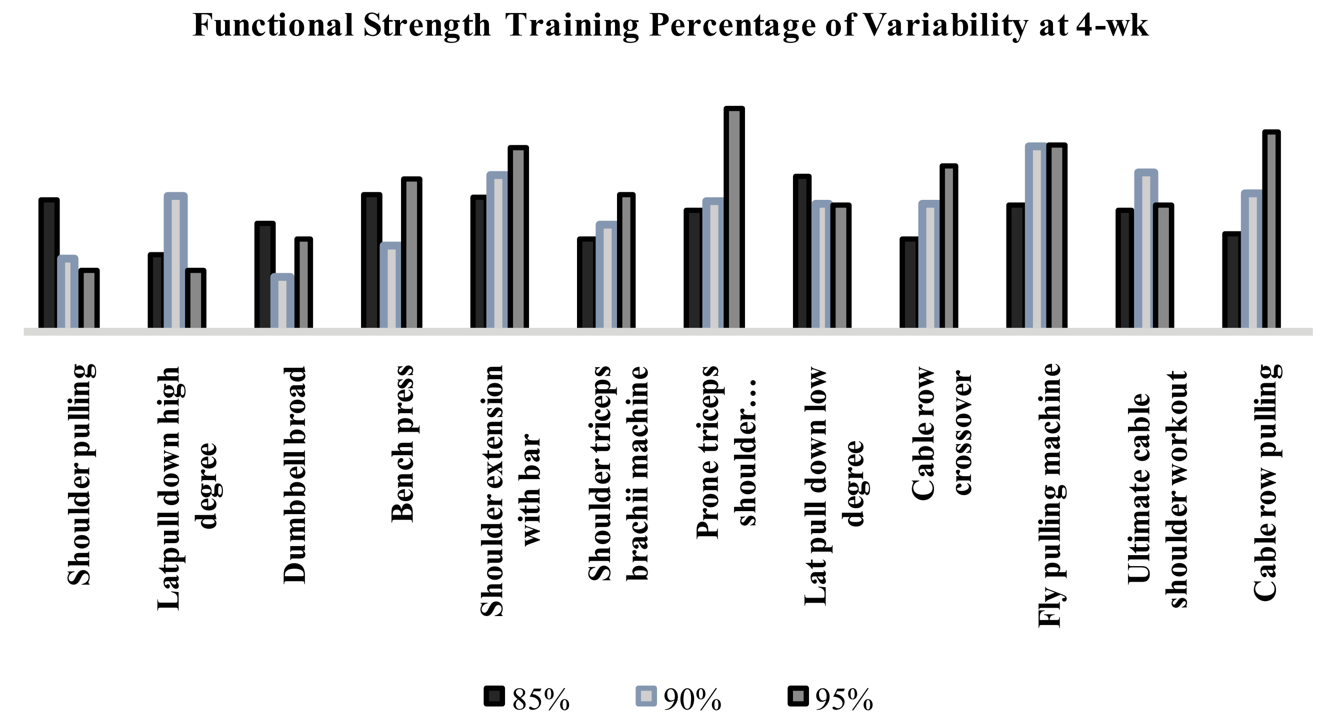

Figure 1: Upper compartment functional strength showed in changes percentage.

resistance seen multiple muscle degree III-IV phase no injury before functional strength training.

Progressive functional strength training

A 4-wk progressive strength program was created for functional upper compartment muscle-tendon dynamics. For pre-workout gain, a functional lunge, back squat, deadlift, and split jump consist of 8-10 repetitions. Controlled manipulation then was performed immediately after FST group performed in multi-muscular joint dynamic movements. Functional strength training was started when muscle grades were optimal. Respectively, upper shoulder and humerus movements were applied 80-95% of 1-RM intervals changes. Firstly, shoulder pull was performed as postural structure movement, a lifting performance 85-90% of 1-RM at a periodic intensity between 3-5 sets of strength and muscle power (Table 2). The high degree of latpull down and dumbbell broad shoulder binding exercises performed in muscle strength energy adaptation. But for maximal power generation 90-95% of 1-RM, therefore, cable row crossover has maximal strength with fly pulling and ultimately cable shoulder movement and cable row pulling were performed through muscle power endurance improvement in the planing method. Training periods lasted one half hours and between each setwas given about one min. Total change percentage showed in the upper strength sets within a 4-wk and 3 days (Figure 1).

Funtional training took place in the superficial and deep muscle activity in the full upper compartment. The upper compartment intensity periods were determined from percentages and it was progressive in the principle of correct external loading each training.

Upper compartment strength test

A Newton gauge isometric handgrip strength was used for absolute shoulder girdle strength and humerus longitidunal, including the best trial in 3 phases of generated force testing [12]. The external mechanic strength evaluation of triceps torque arm was concluded at 45° degree humerus raising and 90° degree shoulder joint abduction mobility. Along with humerus strength

Table 3: CON group upper strength angular degree results.

Strength Variables	FST group					
	Pre test	Post test	P-values	95% CI	Standardize ES	Cohen' d ES
45° Dominant	24.38 ± 2.49	26.05 ± 1.86	0.001***	2.43-0.90	1.19	0.75
45° Non-dominant	23.54 ± 1.79	24.84 ± 1.90	0.004**	2.18-0.41	1.39	0.70
90° Dominant	18.81 ± 2.51	19.87 ± 2.25	0.001***	0.54-4.16	0.96	0.44
90° Non-dominant	22.94 ± 1.93	23.58 ± 2.64	0.001***	3.35-4.40	1.13	0.27

*p < 0.05; **p < 0.010; ***p < 0.001

Table 4: Comparison of upper strength training between FST group and CON group.

Strength variables	Test	Mean difference	Confidence interval 95%	P-values	Population ES
45° Dominant	PRE	2.76	0.69-4.83	0.011*	1.13
	POST	4.00	2.16-5.84	0.001***	1.84
45° Non-dominant	PRE	0.11	1.53-1.75	0.88	trival
	POST	0.62	1.22-2.44	0.49	trival
90° Dominant	PRE	1.46	0.54-3.47	0.14*	0.62
	POST	4.61	2.72-6.53	0.001***	2.06
90° Non-dominant	PRE	0.89	-1.94-1.77	0.92	trival
	POST	0.78	-5.56-3.50	0.001***	1.78

*p < 0.05; **p < 0.010; ***p < 0.001.

showing arm dynamic strength at 45° degree, the strength production in the 90° degree shoulder raising movements are demonstration of postural muscle force. The upper shoulder absolute isometric strength values obtained by FST group in between one and four weeks phases showed abduction average values. There were only 2 left-handed participant in this study. Therefore, the strength difference was determined in both shoulder and humerus longitidunal region [8].

Statistical analysis

An initial power analysis was computed with an assumed type II error rate of .05 (95% statistical power) to detect significant and medium size affect [17] by ainteractions. After normal distribution examined Shapiro-Wilk Test, an T-test statistic used in the study to compare the average data obtained between group differences for significant values. The effect size for difference or level of change obtained 0.20 small, 0.60 medium and ≥ 0.80 large effect as reference. All data analysis were performed using 28 SPSS (version SPPS 28 Inc Chicago, TR).

Results

FST group were performed functional 4-wk strength training periodic sequences according to training percentages and control group no training. Shoulder-humerus angular degree strength resulted in all strength measurement both dominant and non-dominant hand (Table 3). The population of the study before strength test change difference and effect size shown in the statistic (Table 4). A statistical change in all groups was presented graphically (Figure 2).

Study effect sizes that would affect the population were determined consequence of the pre-post comparison of the FST group. Significant differences ($p < 0.001$; $d = 1.20$ high effect) were obtained at the 45° angular degree in the dominant arm and in the non-dominant arm ($p < 0.002$; $d = 0.80$ high effect) obtained. Similarly, a significant difference ($p < 0.001$; $d = 1.41$ high effect) was found in the 90° angular degree in the dominant arm. Only the non-dominant arm showed a significant difference in force output ($p < 0.044$; $d = 0.35$ moderate effect) at the 90° angular degree.

Study effect sizes of control group were determined consequence of the pre-post comparison. Significant differences ($p < 0.001$; $d = 0.75$ medium effect) were obtained at the 45° angular degree in the dominant arm and in the non-dominant arm ($p < 0.004$; $d = 70$ medium effect) obtained. Other significant difference ($p < 0.001$; $d = 0.44$ small effect) was found in the 90° angular degree in the dominant arm. The non-dominant arm showed difference ($p < 0.001$; $d = 0.2$ moderate effect) at the 90° angular degree.

Strength variable predictors were revealed as the consequence of the comparison of force variables in the upper compartment.It can be angular degrees with high effect sizes together in population studies. Strength variables were determined consequence of the pre-post comparison of between the FST group and CON group. Significant differences ($p < 0.011$; $d = 1.13$ high effect) were obtained at the 45° angular degree in the dominant arm of FST group and in the non-dominant arm (p <

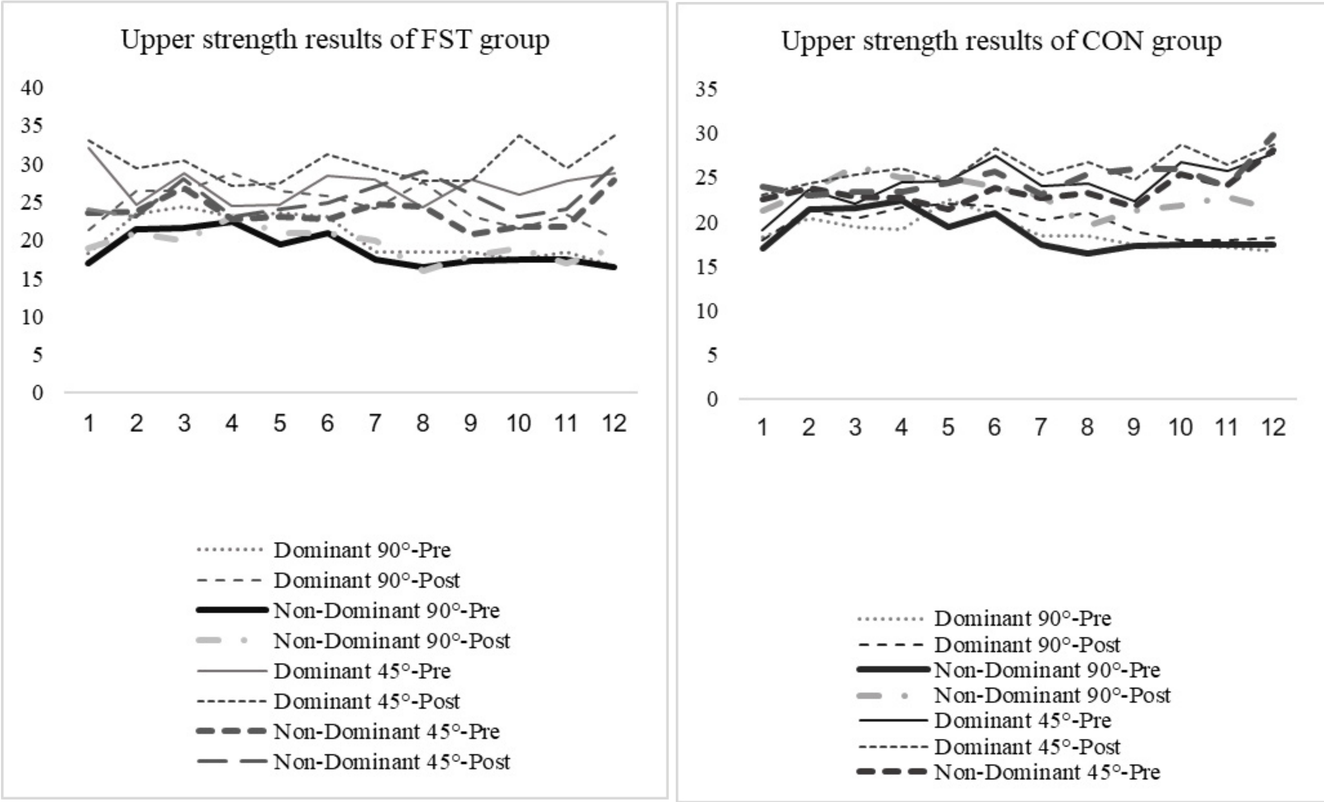

Figure 2: Angular degree graphic of FST and CON group upper strength.

0.001; *d* = 1.84 high effect). Other significant difference the pre test ($p < 0.014$; *d* = 0.62 high effect) was found in the 90° angular degree in the dominant arm of FST group and again FST group ($p < 0.001$; *d* = 2.06 highly effect size) in the post test. The non-dominant arm showed a significant difference in force arm 90° angular degree ($p < 0.044$; *d* = 0.35 moderate effect) in the post test ($p < 0.05$).

Discussion

A functional upper strength program was included for the first time in our study and examined functional angular degree isometric muscle strength difference region. Ultimately, isometric strength increases in multiple deep and superficial muscle groups of the functional strength program applied for 4 weeks were confirmed. The results revealed that flexibility in the shoulder-humerus regions and energy was obtained tendon tensions. Previous study was performed to examine strength variation in the upper compartment postural muscles during eight-week long term corrective exercise program, suggest that cervical muscles, upper trapez, lower trapezius and serrates anterior muscle significantly affect changes on the postural shoulder junction muscles strength. The main finding of this study supported our hypothesis that 45-90° angular degree intervention increased rotational strength internal changes. This data support enhance or pre-post significant results showed that sternocleidomastoid (*d* = 1.51), upper trapezius (*d* = 2.11), lower trapezius (*d* = 1.52) and serratus anterior (*d* = 1.49) observed considerable effect size in decreasing muscle activity [10]. The FST group, there was a high effect (*d* = 1.20, *d* = 1.41) dominant shoulder-humerus strength increases, results revealed that the muscle force affect positive the forward head and shoulder rounded [15].

The study CON group were physical individuals. However, in the CON group impact size was obtained at 45° angular degrees pre-post test results in both dominant (*d* = 70) and non-dominant (*d* = 75). Another study, extensive exercises performed in physical individuals resulted in activation in surface and deep muscles. However, functional training was included in the study without a control group, but in accordance with all individuals [11].

Functional training for muscular endurance, involving different muscles in a functional phase affects muscle strength in a short time, while the effects on the response of the training variables to functional movements are more important in long-term muscle strength training. Our study, isometric muscle activity work out at 4-wk functional strength highly increased and 45-90° angular degree can be isometric multiple muscle complex into postural region [8]. However, more than study has applied complex training to shortened and weaknessed muscles for postural muscle strength in progressive [3].

Schneider, et al. [2] reported that shoulder-humerus isometric strength response to 60-90° angular degree may be different in volleyball players. Moradi, et al. [5] examined that one threband exercise for throwing performance efficiency per week strengthening section in volleyball players. Resistances increase arm strength, but there is a limitation in changing the working principles in frequency differences in the shoulder area. Morover, shoulder internal rotator deficiency decreased with external 90° rotation and catching and 90° perturbe scapular plan exercises. Therefore, upon upper compartment different forces can be realized that other studies in functional period squences showed 50%-70% of 1-RM intensity [18]. This study, it has been suggested that mostly percentage changes revealed to by progressive muscle strength. Although it has been studied higher or lower percentage of muscle activation our muscle training program in principle it can be used in elite athlete.

One study, changes in functional movements were found to be directly related to shoulder height and strength. Percentage changes for muscle loading were seen only in extrinsic influence. However, the principle of muscle using heat energy in similar activities is not the same. Therefore, it is appropriate to include more functional exchange exercises such as dumbbell curl and broad [7].

Cuckova, et al. [3] other studies have been compensatory in the strength development of volleyball players. Muscle functional exercises To counterbalance and imbalance were performed five times pre week. Our study applied intense training for 3 days. As for the duration, they performed 30 minutes, we applied 1.30 hours and more functional training. Concequence showed shoulder elevation may have acquired a significant range of motion. This condition has no injury and postural muscle deficiency.

Muscle memory in movements was obtained in individual percentages at stages of neuromuscular change. Hand, forearm, and elbow response results in the upper compartment varied. Because the external resistive load rejects the same working force in different regions of the force. For this reason, the athlete should awareness of heat and power changes during repetition and rest in the individual shoulder and hand-raising movements [3,5,18].

In conclusion, high-impact functional training should take place in the activity and strength of upper compartment muscles in all age and gender. Accurate periodization is essential without injury due to percentages in functional training. The study showed that functional exercises can be used in other sports branches.

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Conflict of Interest

The authors declare that the research was conduction in the absence of any commercial or financial relationships and no conflict of interest.

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References

1. Hadzic V, Sattler T, Veselko M, Markovic G, Dervisevic E (2014) Strength asymmetry of the shoulders in elite volleyball players. J Athl Train 49: 338-344.
2. Schneider P, Benetti G, Meyer F (2004) Muscular strength of 9-18 year-old volleyball athletes through computational dynamometry. Rev Bras Med Esporte 40: 92-97.
3. Čučková T, Süss V, Carboch J (2017) Along-term cohort study of the muscle apparatus of female volleyball players after the application of a compensatory programme. AUC Kinanthropologica 53: 126-137.
4. Arabi E, Nazemzadegan GH (2021) Comparison of upper limb disability in overhead women athletes of handball, volleyball, softball, and swimming. Physical Treatments 11: 103-110.
5. Moradi M, Hadadnezhad M, Letafatkar A, Khosrokiani Z, Baker JS (2020) Efficacy of throwing exercise with TheraBand in male volleyball players with shoulder internal rotation deficit: a randomized controlled trial. BMC Musculoskelet Disord 21: 376.
6. Declève P, Van Cant J, Cools AM (2021) Reliability of the Modified CKCUEST and correlation with shoulder strength in adolescent basketball and volleyball players. Braz J Phys Ther 20: S1413-3555(21)00005-8.
7. Bordelon NM, Wasserberger KW, Cassidy MM, Oliver GD (2021) The Effects of Load Magnitude and Carry Position on Lumbopelvic-Hip Complex and Scapular Stabilizer Muscle Activation During Unilateral Dumbbell Carries. J Strength Cond Res 35: S114-S119.
8. Alenabi T, Whittaker RL, Kim SY, Dickerson CR (2019) Arm posture influences on regional supraspinatus and infraspinatus activation in isometric arm elevation efforts. J Electromyogr Kinesiol 44: 108-116.
9. Gillani SN, Ain Q, Rehman SU, Masood T (2020) Effects of eccentric muscle energy technique versus static stretching exercises in the management of cervical dysfunction in upper cross syndrome: A randomized control trial. J Pak Med Assoc 70: 394-398.
10. Arshadi R, Ghasemi GA, Samadi H (2019) Effects of an 8-week selective corrective exercises program on electromyography activity of scapular and neck muscles in persons with upper crossed syndrome: Randomized controlled trial. Phys Ther Sport 37: 113-119.
11. Seidi F, Bayattork M, Minoonejad H, Andersen LL, Page P (2020) Comprehensive corrective exercise program improves alignment, muscle activation and movement pattern of men with upper crossed syndrome: Randomized controlled trial. Sci Rep 10: 20688.
12. Majstorovic N, Dopsaj M, Grbic V, Savic Z, Vicentijevic A, et al. (2020) Isometric strength in volleyball players of different age: a multidimensional model. Appl Sci 10: 4107.
13. Sun A, Yeo HG, Kim TU, Hyun JK, Kim JY (2014) Radiologic

assessment of forward head posture and its relation to myofascial pain syndrome. Ann Rehabil Med 38: 821-826.

14. Grabara M (2015) Comparison of posture among adolescent male volleyball players and non-athletes. Biol Sport 32: 79-85.
15. Daneshmandi H, Harati J, Poor SD (2017) Bodybuilding links to upper crossed syndrome. Physical Activity Review 5: 124-131.
16. Kendall FP (2005) Muscles testing and function with posture and pain. 5. Baskı, Philadelphia, America., Lippincont Williams & Wilkins.
17. Maxwell SE (2004) The persistence of underpowered studies in psychological research: Causes, Consequences, and Remedies. Psychol Methods 9: 147-163.
18. Kitamura K, Roschel H, Loturco I, Lama L, Tricoli V, et al. (2020) Strength and power training improve skill performance in volleyball players. Motriz: Rev Educ Fis 26: e10200034.