



Research Article

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Performance-Related Fitness Variables, and Metabolic, and Physiological Components among Athletes

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ABSTRACT

The key goal of the existing study was to compare the influence of functional and grid training on certain performance-related fitness and playing ability of young football players. 120 football players at the age range of 18 to 22 years were divided into four groups: Group I was functional training group (FTG, n=30), Group II was Grid Training Group (GTG, n=30), Group III was combination of Functional Training and Grid Training Group (CFTGTG, n- 30) and a control group (CG-n= 30). The training was for a period of 12 weeks, twice per week and 50 minutes per session. A pre and post-test was taken in agility (Shuttle run), speed (50 M Run), resting heart rate, food intake and overall playing ability measured objectively by 3 experts. ANCOVA was the statistical tool and 0.05 level was determined as the level of significance. The results indicated that there was significant improvement in the study variables, such as, agility, resting pulse rate, food intake and playing ability in football due to functional training, grid training and combined training compared to the control group. On the other hand, there was no significant improvement in the variable of speed since no changes were shown.

Key words: *fitness, metabolic component, physiological component, playing ability.*

INTRODUCTION

Sports shape social bodies as well as education, economy, art, politics, law, mass communication and even international spheres [1]. Technology has incessantly transformed our universe, and augmented the prominence of assessing and monitoring performance pertinent to physical, physiological and anthropometrical parameters [2]. Research has revealed that a physically fit individual is able to endure exhaustion for extensive periods compared to an unfit person since a physically fit person is more fortified to bear physical trauma, he is resilient and has a proficient heart. Moreover, there is an association between good perceptual preparedness, absenteeism of nervous tautness, and physical fitness [3]. The terminology of sports is sometimes protracted to cover all competitive accomplishments, irrespective of the level of physical activity [4].

Football is one of the most protuberant games in the globe. It is a forgone conclusion that the one to entice the biggest spectators was not a prodigious political event nor a distinctive fete of some multifaceted achievement in the art or science but a modest game; a football match [5]. The most exciting quality of football is that it is a quick moving and fast flowing game [6]. The uncomplicatedness of the rules and awareness of the tactical moves make each moment to play instantly unpredictable to the watching eyes [7, 8]. A player must cope both his body and the ball with his feet and has to proceed with different speed and course; hence, requiring all the motor qualities to be successful. In this regard, skills progressively play an indispensable role in the pursuit for success [9]. There

are numerous skills associated with this game like passing, dribbling, kicking, heading, throw-in, ball control, volleying, trapping and application to innumerable situations [10].

Wide-ranging scientific principles and established training techniques were specified to fashion a modified, and effective workout design [11]. Techniques, or sport-specific technical skills, are a dominant element in the progress of young athletes in various sports. Numerous studies have considered the kinematics of specific skills and the strength and flexibility of players of diverse skill echelons, and the physical fitness and soccer skills of youth players and non-players.

Functional training encompasses training or practicing the precise demands of a position or a role. This can be for a distinct player, or for a unit (such as defense). Functional movement is the capacity to yield and maintain a constancy between mobility and stability alongside the kinetic chain while executing fundamental patterns [12].

The Grid Training program is aimed at permitting the individuals as well as the groups to establish their strengths and weaknesses and emphasis on their skills, knowledge and progressions that are vital to achieve success at different stages in the organization [13]. The player's concentration should be on the ball and not merely running to each cone.

Physical exercises have the capability of making one mentally sharp, physically contented and ease with his body and better able to manage with the burdens that everyday life creates upon individuals [14]. Physical exercise assists an athlete to possess an extraordinary degree of physical conditions [15]. Football entails distinctive movement skills, taps high-class energy mechanisms and decrees training methods that will augment multi-directional expertise. The performance-related fitness components like speed, agility and resting pulse rate, which were more linked with the football playing aptitude, were considered for this study. There was a lack of researches making a comparative effect of functional training and grid training on certain performance-related fitness and playing ability and hence this study was conducted.

METHOD

120 football players between 18 to 22 years were selected as the subjects of the study. The selected subjects were divided into four groups, Group I was functional training group (FTG, n=30), Group II was Grid Training Group (GTG, n=30), Group III was combination of Functional Training and Grid Training Group (CFTGTG, n- 30) and a control group (CG-n= 30) consisting of 30 subjects in each group. The subjects were oriented on the purpose of the study and the usefulness in improving performance-related fitness variables. All the subjects voluntarily participated in the study. The training was for a period of 12 weeks, twice per week and 50 minutes per session. Prior to experimental treatment, all the subjects were measured in the performance-related fitness components, such as, agility (Shuttle run), speed (50 M Run), metabolic component of food intake, physiological variable of resting pulse rate and overall playing ability measured objectively by 3 experts, which formed pre-test scores. After the 12th week, all the three groups were tested on the variables selected, which formed post-test scores. The control group was not given any training. The difference between pre and post-test scores were considered as the effect of the selected experimental treatments. To test the statistical significance of the difference, the obtained pre and post test scores of all the four groups were analyzed using ANCOVA. In all cases, 0.05 level was considered as the level of significance.

RESULTS

Table 1. The ANCOVA results for the study variables

Training Groups	Variables	Pre test			Post test		
		Mean	SD	F ratio	Mean	SD	F ratio
Functional	Speed	7.78	0.43	0.28	7.73	0.43	0.38
Grid		7.83	0.37		7.76	0.48	
Combined		7.73	0.53		7.68	0.53	
Control		7.83	0.56		7.83	0.56	
Functional	Agility	10.67	0.68	0.15	10.42	0.58	2.90*
Grid		10.71	0.51		10.56	0.54	
Combined		10.74	0.42		10.45	0.42	
Control		10.76	0.54		10.76	0.54	
Functional		1468	583.1	2.84	1789	634.5	6.99*

Grid	Food Intake	1424	662.3	0.22	1725	538.8	3.59*
Combined		1558	489.1		2014	759.4	
Control		1316	400.4		1346	522.3	
Functional		69.60	3.31		67.00	2.80	
Grid	Resting Pulse Rate	68.60	3.76	2.40	65.86	2.97	6.84*
Combined		68.80	4.58		65.82	3.66	
Control		69.60	3.31		69.06	2.81	
Functional		65.97	13.52		71.67	10.98	
Grid	Playing ability	60.00	9.99	2.40	69.00	8.58	6.84*
Combined		67.87	16.06		72.67	16.06	
Control		62.25	10.32		62.25	10.32	
Functional		65.97	13.52		71.67	10.98	

The data reveals the pre-test mean (M) \pm Standard Deviation (SD) on speed of FTG, GTG, CFTGTG and CG which was 7.78 ± 0.43 ; 7.83 ± 0.37 , 7.73 ± 0.53 , and 7.83 ± 0.56 , respectively. The obtained F ratio was not significant which indicates no significant difference in the means of the groups at the initial stage. The post-test M+SD on speed of FTG, GTG, CFTGTG and CG was 7.73 ± 0.43 ; 7.76 ± 0.48 , 7.68 ± 0.53 & 7.81 ± 0.51 , respectively. The obtained F ratio of 0.38 showed an insignificant difference in the means of the groups after the experimental treatment.

With regard to the pre-test, M+ SD on agility of FTG, GTG, CFTGTG and CG was 10.67 ± 0.68 ; 10.71 ± 0.51 ; 10.74 ± 0.42 and 10.76 ± 0.54 , respectively. The obtained F ratio of 0.15 on the pre-test of the groups was not significant at 0.05 level for the groups at the initial stage. In the post-test, M \pm SD of FTG, GTG, CFTGTG and CG was 10.42 ± 0.58 ; 10.56 ± 0.54 , 10.45 ± 0.54 and 10.79 ± 0.49 , respectively. The obtained F ratio of 2.90 on the post-test means of the groups was significant at 0.05 level.

The result of the pre-test means pertinent to the food intake demonstrates the values of FTG, GTG, CFTGTG and CG that were 1468 ± 583.1 , 1424 ± 662.3 , 1558 ± 481.9 and 1316 ± 400.4 , respectively. The F ratio of 2.84 for the pre-test was not significant ($P > 0.05$). In the post-test, M \pm SD of FTG, GTG, CFTGTG and CG showed values of 1789 ± 634.5 , 1725 ± 538.8 , 2014 ± 759.4 and 1346 ± 522.3 , respectively. The acquired F ratio of 6.99 was significant ($P > 0.05$). The paired mean difference between the FTG, CTG, and CFTGCTG did not generate any significant result ($P < 0.05$); however, the CFTGCTG group displayed a significant difference with CG ($P > 0.05$).

The pre-test means of the resting pulse rate of the FTG, GTG, CFTGTG, and CG were 69.60, 68.60, 68.80 and 69.60, respectively. The pre-test F ratio value for the resting pulse rate shows that there is no significant difference between the FTG, GTG, CFTGTG, and CG. The post-test means on the resting pulse rate of the FTG, GTG, CFTGTG, and CG were 67.00, 65.86, 65.82 and 69.06, respectively. The post-test F ratio value for the resting pulse rate was 3.59, which was significant between the experimental groups at 0.05 level of confidence ($P < 0.05$). The paired mean difference between the FTG, CTG, and CFTGCTG did not yield any significant change ($P < 0.05$); but, all the three training groups disclosed a significant difference with CG ($P < 0.05$).

Statistical of the playing ability witnessed significant difference after the post-test. The M + SD for the FTG, GTG, CFTGTG, and CG on the pre-test was $65.97 + 13.52$, $60.00 + 9.99$, $67.87 + 16.06$, $62.25 + 10.32$ with a F ratio of 2.40 at 0.05 level which was insignificant at the early period; whereas, the post-test M + SD for the FTG, GTG, CFTGTG, and CG was $71.67 + 10.89$, $69.00 + 8.58$, $72.67 + 8.58$, $61.00 + 9.45$, respectively. The obtained F ratio of 6.84 on the post-test means of the groups was significant at 0.05 after the treatment.

It is to be noted that the results with regard to the pre-tests for speed, agility, resting pulse rate, food intake and playing ability indicate no significance as shown by the F ratio of 0.28, 0.15, 0.22, 0.84, and 2.40 for the above variables, respectively. In the post-test of the speed with F ratio of 0.38, no significant result was shown. On the other hand, the remaining variables like agility, resting pulse rate, food intake and playing ability were significant at the 0.05 level with F ratios of 2.90, 3.59, 6.99, and 6.84, respectively.

DISCUSSION

The key goal of the present study was to compare the influence of functional training and grid training on certain performance related fitness and playing ability of young football players.

In this regard, there are abundant training modalities, which have been employed to improve explicit skills and playing performances. Hoffmann et al. (2013) sketched the benefits and general versions of three universally used

and effective conditioning approaches [16]: high intensity interval training, repeated sprint training, and small-sided games (Grid training). Davies et al. (2013) abbreviated research from an environmental intricacies program of work on team sports embodying how small-sided and conditioned games (SSCG) can boost skill fulfilment during training [17]. Martin (2016), Almeida et al. (2013), and Sampaio et al. (2013) have worked in this regard [18-20].

Taylor et al. (2015) showed that sprint interval training could induce small to large improvements in activities where strength, power, and speed are needed [21]. He also highlighted that in some cases, repeated sprints are more efficient at improving short-sprint performance. Jerome et al. (2018) in their study also confirmed some improvements in speed when short bouts of sprint training were administered [22]. In our study, the training was functional and grind where the short bouts of speed were not the main plank and hence there was no significant effect in speed thus annulling the results of the other studies.

Our study found that there was a significant difference in means of the groups after the investigational regimen in agility of the subjects. Agility is vibrant and is deliberated by one of the strategic constituents of fitness and strength. It is an attribute wherein an individual moves and changes course or position instantly based on quick reflexes, coordination, balance and speed. Agility proficiency demands good vibrant balance. Agility embodies an essential performance element that should be incorporated in the training system [17]. In a recent methodical assessment and meta-analysis, Asadi et al. (2017) observed the impact of maturation on agility performance gains after different trainings [23]. Results from 16 studies were analyzed which discovered major effect sizes (ES) for the clusters aged 16–18 years (ES = 0.99) and 13–15.9 years (ES = 0.95) matched to the youngest cluster aged 10–12.9 years (ES = 0.68). Subsequent new studies of Asadi et al. (2017), Hammami et al., (2016), and Chaouachi et al., (2017) advanced that the addition of agility in training protocol can influence in additional performance enhancing effects as contrasting to the combination of training [23-25]. The results of the present investigation validated the above outcomes of the studies of the previously mentioned researchers.

Insufficient caloric intake results in many problems [26] particularly if the inadequate food intake is continued for a long period. The negative consequences of inadequate food intake can be witnessed in all age groups [27]. This problem can be resolved with supervised nutritious diet, appropriate hydration, liquid supplements as well as vitamin and mineral supplements. In addition, one needs to consume more food intake and supervised physical activity [28]. The studies of Juul et al. (2018), Westerterp (2018) and Zinöcker & Lindseth (2018) had stressed that diet restoration involving high caloric and nutritious food along with strength training exercises will progress to healthy weight gain [29-31]. Our study also confirmed to the above as the investigation showed a higher food intake by the subjects of the study.

The present study results on resting pulse rate found significant improvement on resting pulse rate after the period of training schedule. Sharma and Kailashiya (2018) found that grid and functional training among male players significantly found improvements in resting pulse [32]. Deuk-Ja et al. (2016) explored that strenuous exercises significantly reduces the resting pulse rate [33]. Anne et al. (2018) revealed in his study on different types of training decreasing resting heart rate [34].

The training protocol utilized in the study yielded a positive result on the playing ability of the subjects. Gabbett et al. (2009) established that game-based training offers a safe and effective technique of training for team-sport sportspersons that result in analogous and greater enhancements in physical fitness and playing ability skills [35]. The results achieved are consistent with the opinion of the efficacy of the concentration grid exercise advised by both Gill (2000) and Moran (2000) [36, 37]. The results of our study corroborate with the above stated studies and with the investigations of Ali (2011), Greenlees et al. (2006), and Gabbett et al. (2009) [35, 38, 39].

CONCLUSION

It was concluded that there was a significant improvement in performance-related variables such as agility, resting heart rate, food intake and playing ability in football due to functional training, grid training and combined training compared to the control group. On the other hand, there was no significant improvement in the variable of speed, which did not show any noteworthy change due to the treatment.

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