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Research Article

Effect of concurrent training combined with selected nutritional design on selected physical fitness componenets of male football players

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ABSTRACT

Concurrent Training (CT) is the combination of resistance and endurance training in a periodized program to maximize all aspects of physical performance. Nutrition, physical performance and the level of functional capacity of the human beings are interrelated. Any dietary deficiency that adversely affects the health of the individual is likely to impair his or her physical performance capacity. The purpose of the present study was to find out the effect of concurrent training combined with selected nutritional design on selected physical fitness components of male football players. To achieve the purpose of this study, 28 male football players' subjects of Nekemte Kenema were selected by using census sampling technique and their age ranged from 20 to 24 years old. The subjects were undergone twelve weeks concurrent training combined with selected nutritional design for three days per week with duration of 70 minutes. Subjects of experimental groups were tested on physical fitness components prior to and after the 12 weeks consumption of nutrition design combined with training period. The data collected from the participants pre and post-test was statistically examined to find out the significant improvement by using SPSS version 20, descriptive and paired t-test. In all cases, the criteria for statistical significance were set at 0.05 level of confidence ($P<0.05$). The results show that there were significant positive changes on selected physical fitness components.

Keywords: Concurrent Training, Nutrition, and Physical fitness components.

INTRODUCTION

Concurrent Training (CT) is the combination of resistance and endurance training in a per iodized program to maximize all aspects of physical performance. Unless an athlete is in a pure-power sport like Olympic weightlifting, or a pure-endurance sport like long distance cycling; a combination of both power-related and endurance-related attributes are required to excel in mixed-type sports. Boxing, basketball, soccer, hockey and many other team-based sports fall under this category (Geoff, 2017).

Nutrition, physical performance and the level of functional capacity of the human beings are interrelated. Any dietary deficiency that adversely affects the health of the individual is likely to impair his or her physical performance capacity. Thus, nutrition and wellbeing plays a vital role in the field of sports and overall performance of an athlete. Different sports involve different levels of exercise sessions and a balanced diet to have an overall good fitness status. It has been supported by various researches that good nutrition has a very important role in maintaining good health and fitness of the sportsperson so that they can train and compete well (Ackland et al., 2012).

METHODOLOGY

The purpose of the present study was to find out the effect of concurrent training combined with selected nutritional design on selected physical fitness components of male football players. To achieve the purpose of this study, 28 male football players of Nekemte Kemena were selected by using census sampling technique and their age ranged from 20 to 24 years old. The subjects were underwent twelve weeks concurrent training combined with selected nutritional design for three days per week with duration of 70 minutes. Subjects of experimental groups were tested on physical fitness components prior to and after the 12 weeks consumption of nutrition design combined with training period. The data collected from the experimental group's pre and post-test was statistically examined to find out the significant improvement by using SPSS version 20, descriptive and paired t-test. In all cases, the criteria for statistical significance were set at 0.05

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level of confidence (P<0.05).

EXPLOSIVE STRENGTH

(Table 1)Table-1, shows that the pre-test means value and standard deviations of the subjects on explosive strength were 37.28±2.507 were as, post-test mean and standard deviations were 42.5±2.47 respectively with the mean value difference were considered statically significant at p≤0.05. To find out the means difference, the paired t-test was applied and the results are presented in Table-2.

Table 1: Descriptive mean and standard deviation values on explosive strength results of the subjects (score in cm).

Variables	N	Test	Mean	Std. Deviation	Std. Error mean
Explosive strength	28	Pre-test	37.28	2.507	0.473
	28	Post-test	42.5	2.47	0.467

Table 2: The Mean Difference Values and Significance Levels of Pre and Post Test Result of Subject on Explosive Strength Variable.

Explosive strength	Paired Differences					t	Df	Sig. (2-tailed)
	MD	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-test – Post-test	5.21	2.33	0.44	-6.118	-4.31	11.83	27	0

(Table 2)From the table 2 it is clear that the t-value applied to the pre-test means was 11.83 which was greater than the required table value of 1.314 for significant at 0.05 level of confidence with the degrees of freedom 1 and 27. As the above table shows the pre-test and post-test mean difference of the subjects on explosive strength were 5.12 respectively which were greater than the confidence interval level of 0.00 at 0.05 level of confidence. It indicates that, significant differences were existed among the pre test and post test on the lower body explosive strength (power). The findings of the current study shows that there was statically significant improvement on explosive strength of Nekemte kenema B group Football Club from pre test to post test (MD=5.21) due to 12 weeks concurrent training combined with nutritional design.

This finding directly in line with the pervious finding of Marta et al., 2013, who compare the effects of an 8-weeks training period of resistance training alone (GR), combined resistance and endurance training (GCON) and a control group (GC) on explosive strength and VO2max in a large sample of prepubescent boys and girls. A significant but medium-sized increase from pre- to the post-training in the vertical jump (Effect size=0.22, F=34.44, p<0.01) and VO2max (Effect size=0.19, F=32.89, p<0.01) was observed. Concurrent training is equally effective on training-induced explosive strength, and more efficient than resistance training only for VO2max, in prepubescent boys and girls. The findings of current study also agree with the reports of Alves, et al., 2018, who's' paper affords an update review over the state of art regarding the importance of physical fitness and the significance of different combination approaches between resistance and aerobic training. In adolescents, concurrent resistance and aerobic training is equally effective to improve explosive strength compared to resistance training alone, and more efficient in aerobic capacity than resistance training alone.

Nader 2006, Similarly to the endurance training, these specific latter studies demonstrate that effective improvements in explosive strength can be obtained in young elite soccer players by increasing the workload when the training focuses only on one exercise type and is performed in a short-term period. As explained above, the main issue is optimizing the dose-response relationship when more exercise types (explosive strength, endurance, and technical-tactical exercises) are involved in the training over a longer period of time (soccer season). In addition, during concurrent training, the antagonistic intracellular signalling mechanisms could determine the inhibition of strength improvements (inhibition of muscle hypertrophy) when the strength and endurance variables are stimulated simultaneously in a training schedule.

(Figure 1)The above figure clearly showed that there was a significant difference observed between pre-test and post test results on the experimental group in explosive strength of the study subjects.

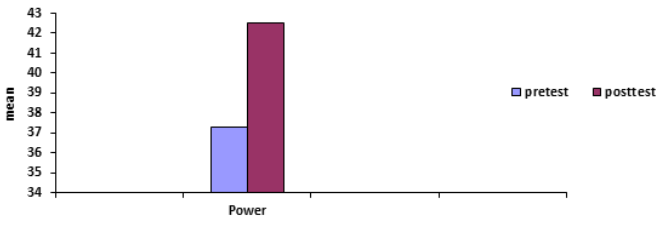

Figure1: Showing the mean comparison of explosive strength results of the Study subjects' pre and post-tests.

Vo2max

(Table 3)Table 3 shows that the pre-test means value and standard deviations of the subjects on Vo2max were 2351.60±131.11 were as, post-test mean and standard deviations were 2614.14±123.36 respectively with the mean value difference were considered statically significant at p≤0.05. To find out the means difference, the paired t-test was applied and the results are presented in table 4.

Table 3: Descriptive Mean and Standard Deviation Values on Vo2max Results of the Subjects.

Variables	N	Test	Mean	Std. Deviation	Std. Error mean
Vo2max	28	Pre-test	2351.6	131.11	24.77
	28	Post- test	2614.14	123.61	23.36

Table 4: The Mean Difference Values and Significance Levels of Pre and Post Test Result of Subject on Vo2max Variable.

Vo2max	Paired Differences					t	Df	Sig. (2-tailed)
	MD	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre test -Post test	262.53	137.85	26.05	-315.99	-209.07	10.07	27	0

(Table 4)From the table 4 it is clear that the t-value applied to the pre-test means was 10.07 which were greater than the required table value of 1.314 for significant at 0.05 level of confidence with the degrees of freedom 1 and 27.

As the above table shows the pre-test and post-test mean difference of the subjects on Vo2max were 262.53 respectively which were greater than the confidence interval level of 0.00 at 0.05 level of confidence. It indicates that, significant differences was existed among the pre-test and post-test on cardio vascular endurance. The findings of the current study shows that there was statically significant improvement on Vo2max of Nekemte kenema B group Football Club from pre-test to post test (MD=262.53) due to 12 weeks concurrent training combined with nutritional design.

The findings of the current study is online with the findings of Petre et al., 2018, who studied on effects of concurrent strength and endurance training have in untrained and moderately-trained individuals. However, studies examining these effects in individuals with a long history of resistance training (RT) are lacking. Additionally, few studies have examined how strength and power are affected when different types of endurance training are added to an RT protocol. Aerobic power (VO2max) only improved after RT + HIIT (4 ± 3%, $p < 0.01$). However, since VO2max improved only after RT + HIIT and this is a time efficient protocol, we recommend this type of concurrent endurance training. The findings of the current study also agree with the findings of The Cantrell et al., 2014, who examined whether concurrent sprint interval and strength training (CT) would result in compromised strength development when compared to strength training (ST) alone. In addition, maximal oxygen consumption (VO2max) and time to exhaustion (TTE) were measured to determine if sprint interval training (SIT) would augment aerobic performance. Anaerobic power, one-repetition maximum (1RM) lower- and upper-body strength, VO2max and TTE were analyzed pre-, mid-, and post-training.VO2max increased 40.9 ± 8.4 to 42.3 ± 7.1 ml/kg/min ($p < 0.05$) for CT, whereas ST remained unchanged. A significant difference in VO2max ($p < 0.05$) was observed between groups post-intervention (CT: 42.3 ± 7.1 vs. ST: 36.0 ± 3.0 ml/kg/min). Preliminary findings suggest that performing concurrent sprint interval and strength improves aerobic performance measures, such as VO2max at the same time.

Whilst the above mentioned training principles are employed for both endurance and strength training regimes, the physiological adaptations for both are notably different due To differences in the application of programme design variables (Dudley and Fleck, 1987). Endurance training programmes such as those used for running or cycling typically involve the performance of high-repetition, low-resistance exercise continuously over long periods of time (e.g. 1-2 hours) (Dudley and Fleck, 1987). The intention of this type of training is to increase aerobic capacity (maximal oxygen uptake (VO2 max), efficiency and economy) through physiological changes including increased muscle capillary and mitochondrial density and enzyme activity in the respiratory pathway Kraemer, et al., 2000. This would suggest that long-term concurrent training may interfere with hypertrophic adaptations through a decreased ribosomal biogenesis and thus, decreased translational capacity Coffey and Hawley, 2017. Wilson and colleagues 2012, was reported that the total training volume (i.e duration and frequency) of endurance training in a concurrent training protocol negatively correlates with hypertrophic and strength adaptations. Research suggests that, in order to maximize adaptations to resistance exercise training, no more than two aerobic exercise sessions should be conducted each week Jones et al., 2013.

(Figure 2)Figure 2: Showed that as there was a significant difference observed between pre-test and post test results on Vo2max of the study subjects. The subjects were showed statically significant difference from pre to post test result.

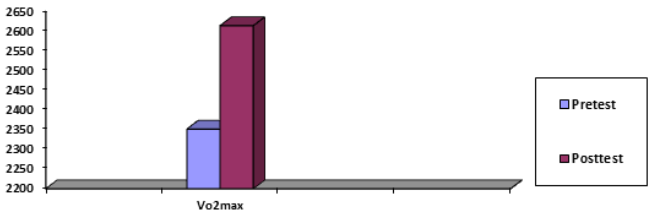

Figure 2: Showing the mean comparison of Vo2max results of the Study subject's pre and post-tests.

BMI

(Table 5)Table 5 shows that the pre-test means value and standard deviations of the subjects on BMI were 20.72±.75083 were as, post-test mean and standard deviations were 23.20±.81330 respectively with the mean value difference were considered statically significant at p≤0.05.

To find out the means difference, the paired t-test was applied and the results are presented in table 6.

(Table 6)From the table 6 it is clear that the t-value applied to the pre-test means was 31.43 which was greater than the required table value of 1.314 for significant at 0.05 level of confidence with the degrees of freedom 1 and 27.

As the above table shows the pre-test and post-test mean difference of the subjects on BMI were 2.478 respectively which were greater than the confidence interval level of 0.00 at 0.05 level of confidence. It indicates that, significant differences was existed among the pre-test and post-test on BMI. The findings of the current study shows that there was statically significant improvement on BMI of Nekemte kenema B group Football Club from pre-test to post test (MD=2.478) due to 12 weeks concurrent training combined with nutritional design.

The findings of the current study agree with the findings of Hamid et al., 2011, who evaluated the effect of concurrent resistance and endurance training on body composition, aerobic power and muscular endurance in college students. Concurrent Distinct Endurance-Resistance (CDER), Concurrent Parallel Endurance-Resistance (CPER) and No Training controls (C). After a 12-week training period, fat-free mass, muscular strength [squat and bench press (kg)], muscular endurance [pull-ups and sit-ups (numbers)], aerobic power, flexibility and Sargent jump height increased similarly in both experimental groups (CDER and CPER). Also, decreases in body fat percentage, mean time in 60 m running and agility occurred in CDER and CPER. A significant difference in body fat percentage was seen in CPER when compared to CDER and C. Although body mass increased only after the CPER protocol application, it can be concluded that both CDER and CPER protocols were similarly effective in positive transformation of body composition, aerobic power and muscular endurance. This finding was supported by the finding of García et al., 2017, who analyzed the effect of 12-week low-volume high intensity interval training (HIIT)-based concurrent training program on body composition, upper- and lower-body muscle strength, mobility, and balance in older adults, as well as to compare it with a low-moderate–intensity continuous training. Body composition and physical functioning were assessed before (pre-test) and after (posttest) a 12-week intervention. The group 3 time interaction showed significant improvements for the EG in body composition parameters (p # 0.05) This HIIT-based concurrent training program led to greater improvements in body composition. This finding also supported by the finding of Jorge et al., 2017, which show improvements of body composition in overweight and obese women. In this context, although the results were not highly marked, CT seems to be a better approach for the prevention and management of the women overweight and obesity than HIIT.

(Figure 3)The above figure showed that there was significance difference on BMI test before and after subjects underwent in 12 weeks concurrent training combined with nutritional design.

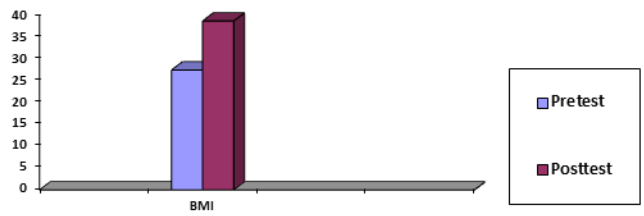

Figure 3: Showing the mean comparison of BMI results of the Study subject's pre and post-tests

CONCLUSION

The result of the study indicated that 12 weeks concurrent training in combined with nutritional design showed significance improvement on performance of the subjects. The findings of the study shows that significant improvement was found on explosive strength after 12 weeks of nutritional design combined with concurrent training. It was concluded from the results of the present study that statically significantly improvement was seen on Vo-2max due to the treatment when compared to pre-test result. The results of the present study shown that 12 weeks of nutritional design combined with concurrent training was significantly improved BMI of the subjects due to the treatment under the study in contrast to pre-test.

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