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Effect of resistance training using ankle weights on explosive leg power of football players

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Abstract
Foot weights are loading devices used athletes feet with a load that can be adjusted according to the athletes need. Exercises using leg weights are not carried out when athletes run, but are carried out during exercises stretching both statistically and dynamically to avoid muscle injury to during exercises. (Tarigan *et al.,* 2022). To examine the effectiveness of AWRT on explosive leg power, the present study was conducted on 40 male college-level footballers aged between 18 and 23 years, drawn from Sri Ramakrishna Mission Vidyalaya Maruthi College of Physical Education and SRKV College of Arts and Science. The participants were randomly assigned into two equal groups (n = 20 each): an experimental group that underwent structured ankle weight resistance training and a control group that continued with their regular activities without any additional training. The experimental group participated in AWRT sessions three times per week for a duration of eight weeks. Explosive leg power were selected as the dependent variables and assessed using standardized tests. Explosive leg power was evaluated through the Standing Broad Jump Test and expressed in meters. Pre-test and post-test measurements were collected on separate days following an appropriate warm-up. An independent t-test was applied to determine the significance of differences between pre- and post-test scores at the 0.05 level of significance. The findings of the study revealed that ankle weight resistance training produced significant improvements in explosive leg power among college-level football players.

Keywords: Explosive leg power, ankle weight resistance training, college football players

Introduction

Weight training is a frequent type of strength coaching for developing the strength and dimension of the skeletal muscles. It makes use of the pressure of gravity (in the structure of weighted bars, dumbbells or weight stacks) to oppose the force generated through muscle by concentric or eccentric contraction. Repetitions, sets, tempo, exercises and force to reason changes in strength, endurance, dimension or formation by means of overloading a crew of muscles (Menoutis, 2014).

Adding resistance to otherwise everyday workout routines has been a trend in the world of fitness for quite some time. There are several items that one could use to add resistance to an exercise, such as resistance bands, a weighted vest, or more popular lately – ankle weights. Incorporating ankle weights to add strength and variety to your exercise routine is a low cost and highly effective option. Using ankle weights while even taking a brisk walk may add extra health benefits. Ankle weights are wearable resistance devices commonly observed as weighted straps secured around the ankles using Velcro fastenings. Typically constructed with neoprene material and filled with sand or similar materials, ankle weights are designed to provide additional resistance to lower-limb movements. The added load increases the demand placed on the muscles of the legs and hips, requiring them to work against greater resistance and gravity, which may contribute to improvements in muscular strength and power. As noted by Downey, the increased load imposed by ankle weights compels the targeted muscle groups to generate greater force, thereby stimulating strength adaptations. However, it is important to note that improper or excessive use of ankle weights may place additional stress on the ankle joint and surrounding structures, potentially increasing the risk of strain or injury to the knees, hips, and lower back.

Traditional running skills allow pressure control of work in tests by specifying the rate at which ankle weight training with low repetitions performed a multiple set are necessary to produce optimal increase in skills. (Salyer, 2019).

Methodology

To achieve the objective of the study, forty participants were randomly assigned into two equal groups: the Ankle Weight Resistance Training Group (AWRTG) (n = 20) and the Control Group (CG) (n = 20). The experimental group underwent a structured ankle weight resistance training programme conducted three days per week on alternate days for a period of eight weeks, whereas the control group continued with their routine daily activities without participating in any additional training programme.

The parameters evaluated in the study were explosive leg power was measured through the Standing Broad Jump Test and expressed in meters. All tests were administered in accordance with standardized testing protocols to determine the effect of ankle weight resistance training on the selected power parameters.

Training Programme

The training program was lasted for 60 minutes per session in a day, 3 days in a week for a period of sixteen weeks duration. These 60 minutes included 10 minutes warm up and 10 minutes warm down remaining 40 minutes allotted for resistance training with ankle weight programme. Every four weeks of training 5% of intensity was increased from 65% to 75% of work load.

Table 1: Eight Weeks Training Schedule For Resistance Training with Ankle Weights

Weeks	Exercises with ankle weight band (1.5kg)	Sets	Rep	Rest in b/w sets	Total Duration
I-IV	Ankle weight with walking Zig-zag running Split-jump Squat jump	2	4	50 sec	60 min
V-VIII	Ankle weight with walking Burpee exercise Pistol squat High knees	2	5	50 sec	60 min

Statistical Analysis

Explosive Power in relation to the effects of the AWRT programme were statistically examined using the paired't' test to determine whether significant differences existed between the pre-test and post-test measurements. For all analyses, the level of significance was fixed at 0.05 ($p < 0.05$), which served as the criterion to identify meaningful improvements resulting from the training intervention.

Table 2: Computation of 'T' Ratio on Explosive Leg Power of College Level Footballers of Experimental and Control Group (Scores in Meters)

Group	Test		Mean	Std. Deviation	T ratio
Explosive Leg Power	Experimental Group	Pre test	1.40	0.56	10.48*
		Post test	1.95	0.63	
	Control Group	Pre test	1.41	0.20	1.57
		Post test	1.39	0.18	

*significant level 0.05 level (degree of freedom 2.09, 1 and 19)

Table II offerings the mean, standard deviation, and computed t-ratio for explosive leg power in the experimental group. The obtained t-value was 10.48, which exceeds the critical table value of 2.09 at 0.05 level of significance with 19 degrees of freedom. This indicates that the improvement in breath holding time in the experimental group was statistically significant.

In contrast, the t-value for the control group was 1.57, which is below the critical value. Therefore, the change observed in the control group was found to be statistically insignificant.

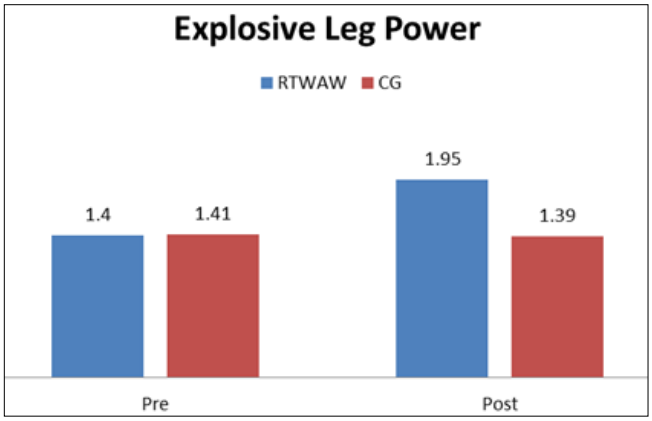

Fig 1: Bar Diagram Showing the Mean Value on Explosive Leg Power of College Level Football Players

Discussion and Findings

Strength-training protocols, including straight plane, diagonal, and rotary exercises, may assist in full return to activity after injury. Ankle weight resistance training can be an effective, specialized tool for football (soccer) players to increase lower limb strength, power, and, consequently, technical performance, provided it is used with appropriate caution and in moderation.

The strikers also had a higher jumping performance compared with that of the midfielders and the full backs but lower compared with the defenders. Strikers need a strong jumping ability to be able to control the long pass from the defenders or to head the ball through or back to one of his teammates. Although the full backs predominantly need explosiveness and speed to pass an opponent along the line, midfielders need to be able to change directions more appropriately and to accelerate with changes in direction.

Enhanced co-activation between quadriceps and hamstrings was observed, and FEA demonstrated a significant decrease in the maximal von Mises stress in the anterior cruciate ligament (ACL) and meniscus. These findings suggest that WR training improves CODA and lower limb muscle coordination while reducing internal knee joint stress, potentially lowering the risk of ACL injuries and enhancing athletic performance. Ugbolue *et al.,* (2026).

Mitchell (1970) [2] The off-season football training program is of considerable value to the individual player who has the desire, determination and time to develop his potential to the fullest. Besides being an aid to the football player, such a program is of definite value to the coach who desires to prevent injuries and to develop a better team. Numerous studies have been completed to examine the effects of selected weight training programs upon various aspects of conditioning. However, it has been only recently that an attempt has been made to design an off season training program specifically for football.

Kirk *et al.,* (2016) [3] intense neural activation of the muscles and mechanical impact on the ankle joint that is part of explosive resistance training might change the mechanical properties of the muscle and connective tissue, but this was not the case to an extent that could be detected with our measurements.

Kofod *et al.,* (2017) [4] Quadriceps muscle weakness is a serious complication of physical inactivity following hospitalization due to acute exacerbations of chronic obstructive pulmonary disease (AECOPD). Progressive resistance training with ankle weight cuffs is feasible in patients who are severely disabled due to AECOPD. The approach is simple and seems to counteract the loss of muscle strength and function during hospitalization.

Considering the attachment site of AWs, the load would be expected to affect the swing motion of the lower limbs and the flexion motion of the hip joint during walking. These movements tend to weaken with aging, and if additional resistance can be selectively applied to these movements, it could not only serve as an exercise load but also suppress the deterioration of walking function among older people. It is also possible that this method could be applied as a high-quality exercise therapy. Because our study regime was not strict, various factors may have affected individual efforts. Furthermore, it was difficult to control for confounding factors, such as the effects of participating in regular

individual exercise classes and sports activity, such as yoga, and use of a personal gym. Akatsu *et al*., (2022) [6].

Ankle weights are a valuable complementary tool for targeted,, localized strengthening in football players. They should be integrated into a comprehensive,, periodized strength and conditioning program, rather than used as a primary, daily training method.

Conclusions

From the results of the study and discussion the following conclusions were drawn.

1. Based on the results and discussion, it was concluded that the 8-week ankle weight resistance training (AWRT) programme was a scientifically structured, low-impact, and football-specific conditioning intervention for college-level football players.
2. The training produced a significant improvement of 39% in leg explosive power, indicating the effectiveness of AWRT in enhancing lower-limb strength and power.
3. This improvement directly contributed to better execution of football-specific skills such as powerful kicking and long passing, which require high levels of explosive leg action.
4. Overall, the findings confirm that an 8-week AWRT programme is an effective and practical training method for improving leg explosive power and related performance skills in football players.

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