IMPACT OF PLYOMETRIC TRAINING AND RESISTANCE TRAINING ON AGILITY

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Abstract: *This investigation aimed to examine the effects of plyometric and resistance training on agility. The study included a sample of forty-five male handball athletes aged 18 to 22 pursuing their Bachelor's degree in the Kadapa district of Andhra Pradesh. The participants were randomly assigned to three groups: Group–I (PTG) underwent Plyometric Training, Group–II (RTG) underwent Resistance Training, and Group–III served as the Control Group (CG). These groups underwent distinct training programs over 12 weeks. Before participation, all athletes provided informed consent per institutional guidelines. The study's results revealed a significant improvement in agility following the training interventions (P<0.05).*

Keywords: Agility, Plyometric Training, Resistance Training, Handball

1. INTRODUCTION

Physical fitness is a fundamental requirement to attain all the goals of physical education. For more than a century, the improvement of physical fitness has been at the heart of the physical education profession 10. Power can be understood as the capacity to exert the highest force in the quickest conceivable timeframe, as demonstrated by activities like vertical jumps, broad jumps, shot put, and other movements involving resistance, all performed in minimal time 11. Circuit training involves a structured approach to training where an athlete participates in a series of selected exercises or activities arranged in a specific sequence or circuit. This training regimen can be organized within a gymnasium, exercise facility, or outdoor courts and fields. It encompasses a variety of training elements, thereby emphasizing overall fitness. This method provides an engaging training environment for athletes and establishes defined intervals and intensities to encourage ongoing athlete development 2-7. Even though our inherent essence is one of joy, individuals often find themselves excessively preoccupied with their thoughts, physical sensations, and material possessions. In doing so, they veer from this intrinsic reality, resulting in a misguided perception. This misidentification leads to feelings of inadequacy, confinement, sadness, and confusion. Yoga offers a pathway for shedding this lack of understanding and fostering recognition of one's genuine, divine nature. The objective is to liberate individuals from these limitations and facilitate their union with their ultimate, universal self 1,8,9.

2. EXAMINATION AND INTERPRETATION OF STUDY DATA AND FINDINGS

A cohort of forty-five male handball athletes, ranging in age from 18 to 22 years and with heights between 158 cm and 164 cm, as well as weights between 62 kg and 65 kg, and pursuing their Bachelor's degrees in the Guntur district of Andhra Pradesh, was deliberately chosen for this study. Among these forty-five male athletes, Group–I (PTG) engaged in Plyometric Training, Group–II (RTG) participated in Resistance Training, and Group–III

served as the Control Group (CG), undergoing the distinct training protocols for 12 weeks. Before their involvement, all athletes provided informed consent following institutional protocols. The data acquired from the three groups before and after the experimental period, specifically focusing on the selected physical fitness variable, agility, were subjected to statistical analysis using covariance analysis (ANCOVA) to ascertain any significant differences. In order to interpret the findings, pre and post-test values were compared within the control and resistance groups, as well as the control and plyometric groups. A significance level of 0.05 was established due to the limited number of subjects. It is important to acknowledge that various external factors could influence the chosen variables, as highlighted in the study's limitations. Furthermore, Scheffe's post hoc test was employed to elucidate the groups' paired mean differences for each variable when the F ratio of adjusted post-test means exhibited significance.

The statistical analysis from Table 1 shows the pre-test, post-test, and modified post-test agility data from plyometric training, strength training, and control groups. The pre-test, post-test, and adjusted post-test mean values for the plyometric training group (PTG) are 20.09 sec, 19.50 sec, and 19.79 sec, respectively. The Resistance Training Group (RTG) pre-test, post-test, and adjusted post-test mean values are 20.44 sec, 19.29 sec, and 19.86 sec, respectively. The Control Group (CG) pre-test, post-test, and adjusted post-test mean values are 20.55 seconds, 20.38 seconds, and 20.47 seconds, respectively.

Table 1. Examination of Covariance concerning Pre-Test, Post-Test, and Adjusted Post-Test Records regarding the Agility levels observed in the Plyometric Training, Resistance Training, and Control Groups.

Test/Group		Plyometric	Resistance	Control	SOV	SS	df	MS	F Ratio
Pre-Test	$\bar{X}$	20.093	20.443	20.559	B	1.769	2	0.885	1.857
	σ	0.336	0.336	0.757	W	20.011	42	0.476	
Post-Test	$\bar{X}$	19.503	19.293	20.385	B	10.086	2	5.043	10.249*
	σ	0.336	0.336	0.804	W	20.665	42	0.492	
Adjusted Post-Test	$\bar{X}$	19.798	19.868	20.472	B	13.001	2	6.501	-33.936
					W	-7.854	41	-0.192	

*Significant at 0.05 level of confidence.

SD: Standard Deviation; SOV: Source of Variance; B: Between; W: Within.

(The critical value from the Table for a significance level of 0.05, with degrees of freedom 2 and 42, is 3.220, and for degrees of freedom 2 and 41, it is 3.226.)

The pre-test F ratio yielded a value of 1.857, which falls below the critical table value of 3.220. Consequently, the pre-test exhibited significance for degrees of freedom 2 and 42, indicating an impact on Agility at a 0.05 confidence level. Conversely, the post-test obtained F ratio registered as 10.248, surpassing the tabulated value of 3.220. Hence, the post-test demonstrated insignificance for degrees of freedom 2 and 42 regarding Agility at a 0.05 confidence level. On the other hand, the adjusted post-test corrected F ratio of -33.93 proved to be lower than the table value of 3.226. Consequently, the adjusted post-test displayed significance for degrees of freedom 2 and 41 concerning Agility at a 0.05 confidence level.

The research findings suggest a noteworthy disparity among the adjusted post-test mean values of the three groups: the control group, the combined plyometric training group, and the resistance training group. It is illustrated in Figure 1, depicting the pre-test, post-test, and adjusted post-test mean values for agility across these groups.

Table 2. Scheffe's post hoc analysis assessed the disparities between the paired mean values of adjusted post-test results concerning the agility levels of the two training groups and the control group

Adjusted Post-Test Means			MD	Required CI
Plyometric	Resistance	Control		
19.798	19.868		0.070	0.3819*
19.798		20.472	0.675	
	19.868	20.472	0.605	

*Significant at 0.05 level

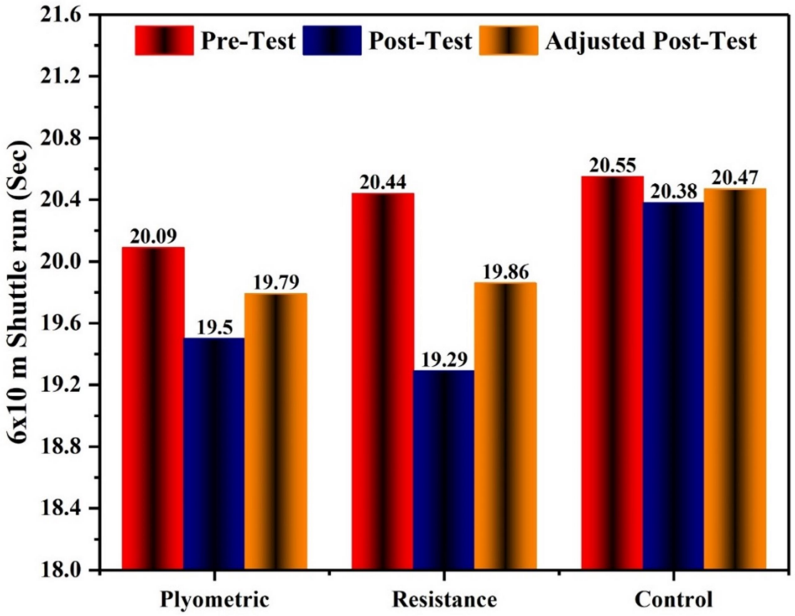

Figure 1. The mean values of the pre-test, post-test, and adjusted post-test measurements for a composite of groups undergoing plyometric training, resistance training, and control conditions concerning Agility.

Scheffe's post hoc examination was utilized to evaluate the presence of significant disparities among the three sets of paired means. The outcomes, detailed in Table 2, present the adjusted post-test mean distinctions in agility for PTG & RTG, PTG & CG, and RTG & CG. At a 0.05 confidence level, the mean-variance among the groups falls below the agility confidence interval threshold of 0.381. It suggests a meaningful connection among the PTG & RTG, PTG & CG, and RTG & CG groups. Notably, the difference in means between PTG and RTG

is 0.07, beneath the confidence interval value of 0.381, signifying significance between these two groups at a 0.05 confidence level. Conversely, the mean differences between PTG & CG and RTG & CG are 0.675 and 0.605, respectively, exceeding the confidence interval value of 0.381. Consequently, no substantial distinction is observed between the PTG & CG and RTG & CG groupings.

3. CONCLUSIONS:

The study's findings concluded that both plyometric and resistance training led to substantial enhancements in the targeted physical attribute of Agility among handball players compared to the control group. Notably, Agility exhibited greater improvement in the plyometric training group than in the resistance training group. Furthermore, the resistance training group displayed higher Agility levels than the control group.

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