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Effect of sand surface resistance exercises and agility training on kabaddi playing parameters among kabaddi players

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Abstract
The study was to examine the isolated and combined sand surface resistance exercises and agility training on kabaddi playing parameters among men kabaddi player. Total N=100 (hundred) men kabaddi players recruited randomly from various college of Guntur district AP, their age period ranged from 18 years to 25 years as per subject's secondary board of education certificate and, who at least participated college level kabaddi tournaments. The chosen men kabaddi players were randomly recruited into four groups each group n=25 men kabaddi players i.e. empirical groups I men kabaddi players underwent: sand surface resistance exercises (SSRK =25), empirical group II men kabaddi players underwent: sand surface agility training (SSAK =25), empirical group III men kabaddi players underwent: combined sand surface resistance and agility training (SRAK = 25) and non-training group kabaddi players (NTKP = 25). NTKP was practiced only their respective specialization game. The training period was fixed for 12- week's duration and four sessions in a week. The measurement of kabaddi playing parameters scores was collected through three kabaddi coaches Judgment rated scale (1 to 10 points) before and after the completion of specific training. The collected scores were analyzed through ANCOVA and level of significant was restricted at 0.05 levels. The study found that isolated and combined sand surface resistance exercises and agility training had positive significant impact to improve kabaddi game performance of men kabaddi players of three empirical group's players comparative to control group.

Keywords: Sand, resistance, exercise, agility and kabaddi

Introduction
Speed and agility training are intended to increase the ability to exert maximal force during high speed movements. Speed and agility training are to increase muscular power, enhanced brain signal efficiency, spatial awareness, motor skill development and reaction time. By improving these skills, the athletes will be able to maintain proper body position during sports skills and react more proficiently to any demand of their sports. Paolo *et al*., (2013) study shows that it is possible to perform maximal intensity sprint with smaller impact shocks without reaching maximum speed and change of direction on sand surface allow to each higher deceleration. It suggests sprinting on sand surface entails a limited stretch of the involved muscles, injury prevention and rehabilitation programs.
Squats are the gold standard when it comes to testing overall conditioning. Squat exercise engages multiple muscles groups quads, hamstrings, glutes, core and upper back making them a full body exercises that builds both strength and endurance. Muscular endurance is how long muscles can perform under sustained effort, while strength endurance is how well body maintains power output over time. A high rep set of body weight squats tests both, pushing muscles to their limits while forcing cardio vascular system to keep pace. In the process, squat reveals ability to handle sustained physical stress, making them invaluable guage of conditioning.

Statement of the Research Problem
To analyze the "Impact of sand surface resistance exercises and agility on kabaddi playing parameters among kabaddi players".

Research Hypothesis
- There will be a significant improvement in score of kabaddi game performance of empirical group's kabaddi players after the twelve weeks impact of isolated and combined sand surface resistance exercises and agility training when compared with control group kabaddi players.
- The combined sand surface resistance exercises and agility training will be more effective than the isolated training program.

Methodology
The study was to measure the isolated, combined sand surface resistance exercises and agility training on kabaddi playing parameters among men kabaddi player. Total N=100 (hundred) men kabaddi players recruited randomly from various college of Guntur district AP, their age period ranged from 18 years to 25 years as per subject's secondary board of education certificate and, who at least participated college level kabaddi tournaments. The chosen men kabaddi players were randomly recruited into four groups each group n=25 men kabaddi players i.e. empirical groups I men kabaddi players underwent: sand surface resistance exercises (SSRK =25), empirical group II men kabaddi players underwent: sand surface agility training (SSAK =25), empirical group III men kabaddi players underwent: combined sand surface resistance and agility training (SRAK = 25) and non-training group kabaddi players (NTKP = 25). NTKP was practiced only their respective specialization game. The training period was fixed for 12-week's duration and four sessions in a week. The measurement of kabaddi playing paramaters scores was collected through three kabaddi coaches Judgment rated

scale (1 to 10 points) before and after the completion of specific training. The collected scores were analyzed through ANCOVA and level of significant was restricted at 0.05 levels.

Table 1: Analysis of Covariance for Kabaddi game performance - Three kabaddi coaches Judgment rated scale (Rating scale 1 to 10 points) of the SSRK, SSAK, SRAK and NTKP groups for kabaddi players

Groups	SSRK	SSAK	SRAK	NTKP	SOV	Sum of squares	df	Mean Square	F' Ratio
Pre-test mean	6.560	6.520	6.300	6.520	B	1.047	3	0.349	0.675^{NS}
SD	0.634	0.906	0.661	0.637	W	49.640	96	0.517	
Post test mean	7.620	7.660	8.060	6.420	B	37.640	3	12.547	22.726*
SD	0.767	0.921	0.600	0.640	W	53.000	96	0.552	
Adjusted mean	7.571	7.634	8.160	6.394	B	41.379	3	13.793	35.576*
					W	36.832	95	0.388	
Mean difference	+1.06	+1.140	+1.760	-0.10	-	-	-	-	-

Note: Table F-ratio value at 0.05 level of confidence for 3 and 96 (df) =2.68, 3 and 95 (df) =2.68 *Significant & NS: Not significant. *Significant

SSRK: Sand surface resistance exercises kabaddi players
SSAK: Sand surface agility training kabaddi players.
SRAK: Combined sand surface resistance exercises and agility training kabaddi players.
NTKP: Non-training group kabaddi players.

The above table-I shows that there is a significant difference on kabaddi playing parameters performance among the four groups such as SSRK: Sand surface resistance exercises kabaddi players, SSAK: Sand surface agility training kabaddi players, SRAK: Combined sand surface resistance exercises and agility training kabaddi players and NTKP: Non-training group kabaddi players. Since the 'F' value required being significant at 0.05 level for 3, 96 d/f and 3, 55 are 2.68, but the computation values of kabaddi playing parameters post and adjusted posttest 'F' values are 22.726 and 35.576 respectively. Which are greater than the tabulated value, it shows that training is effective for positive changes in kabaddi playing parameters performance. Since the obtained 'F' ratio is found significant.

Table 2: The kabaddi game performance - three kabaddi coaches' judgment results of scheffe's method test mean differences between SSRK, SSAK, SRAK and NTKP groups of kabaddi players

SSRK	SSAK	SRAK	NTKP	MD	CI
7.571	7.634	-	-	0.063^{NS}	0.101
7.571	-	8.160	-	0.589*	
7.571	-	-	6.394	1.177*	
-	7.634	8.160	-	0.526*	
-	7.634	-	6.394	1.24*	
-	-	8.160	6.394	1.766*	

Note: * Significant & NS: No significant

SSRK: Sand surface resistance exercises kabaddi players
SSAK: Sand surface agility training kabaddi players.
SRAK: Combined sand surface resistance exercises and agility training kabaddi players.
NTKP: Non-training group kabaddi players.

In above table : 2 presented the the adjusted final mean variations of kabaddi coaches Judgment rated scale (Rating scale 1 to 10 points) performance of college level men kabaddi players between the sand surface resistance exercises (SSRK) and combined sand surface resistance exercises and agility training (SRAK) sand surface resistance exercises (SSRK) and non-training group kabaddi players (NTKP), sand surface agility training (SSAK) and combined sand surface resistance exercises and agility training (SRAK), sand surface agility training (SSAK) and non-training group kabaddi players (NTKP), combined sand surface resistance exercises and agility training (SRAK) and non-training group kabaddi players (NTKP) college level kabaddi players are 0.589, 1.177, 0.526, 1.24 AND 1.766. These computations adjusted final mean variations values are larger than calculated formula CI value 0.101. Hence investigator recorded significant variations resulted between training groups and control groups college level men kabaddi players after completion of 12-weeks empirical period.

The adjusted final mean variations of kabaddi coaches Judgment rated scale (Rating scale 1 to 10 points) performance of college level men kabaddi players between sand surface resistance exercises (SSRK) and sand surface agility training (SSAK) groups college level men kabaddi players is 0.063. This computation adjusted final mean differences values is lower than calculated formula CI 0.101. Hence discover noted insignificant differences resulted between sand surface resistance exercises (SSRK) and sand surface agility training (SSAK) group's college level men kabaddi players after twelve weeks completion of 12-weeks empirical period.

The prior, final and adjusted post scores results mean of the SSRK, SSAK, SRAK and NTKP college level men kabaddi players groups for kabaddi coaches Judgment rated scale (Rating scale 1 to 10 points) performance test clearly represented in bar diagram figure: 1.

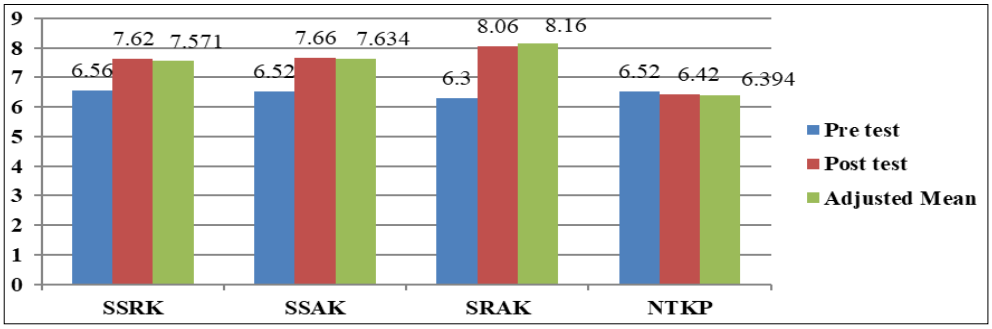

Fig 1: The kabaddi game performance - three kabaddi coaches' judgment pre-post and adjusted post test mean numbers of SSRK, SSAK, SRAK and NTKP groups of kabaddi players presented in bar graph

SSRK: Sand surface resistance exercises kabaddi players
SSAK: Sand surface agility training kabaddi players.
SRAK: Combined sand surface resistance exercises and agility training kabaddi players.
NTKP: Non-training group kabaddi players.

Discussion on Hypothesis

- The first hypotheses stated that there will be a significant improvement in score of kabaddi game performance of empirical group's kabaddi players after the twelve weeks impact of isolated and combined sand surface resistance exercises and agility training when compared with control group kabaddi players. The statistical analysis proved that isolated and combined sand surface resistance exercises and agility training program significantly improved the kabaddi game performance. Hence research first hypothesis accepted.
- The second hypotheses stated that combined sand surface resistance exercises and agility training will be more effective than the isolated training program. The statistical analysis proved combined training is superior to isolated training method. Hence research second hypotheses accepted.

Discussion and Findings

The approach of isolated and combined sand surface resistance exercises and agility training is better for upraise the kabaddi playing parameters performance than non-training group kabaddi players. The list of empirical studies results that covers the kabaddi playing parameters performance are Manik (2015) results found that 12-weeks of weight training protocol is effective for refine raiding skill and blocking skill of Swami Ramanand Tirth Marathwada University Nanded kabaddi players. Prabhakar and Ramesh (2024) [2] results proved that 12-weeks of circuit training develop the stretching ability of hand touch skill and speed of male kabaddi players of Warangal district. Logeshwaran and Annaduari (2018) [3] concluded that practical application of six weeks hatha yoga practices with medicine ball exercises is effective for improvement on overall playing ability of Kovai Kalaimagal College of Arts and Science inter collegiate Kabaddi players. Ponnuruselvan and Manju (2019) [4] outcomes shows that 6 weeks (5 days per week) different training modalities namely strength training and court drills significantly given beneficial alteration in hand touch and holding among RVS College of Engineering and Technology male Kabaddi players. Chitrangada *et al*., (2024) outcome yield that 6-weeks specific training package is useful for significant improvement in kabaddi playing abilities among kabaddi players.

Conclusions

The study concluded that the 12-weeks treatments of isolated and combined sand surface resistance exercises and agility training protocol out come with positively uplifted the Kabaddi game performance - Three kabaddi coaches Judgment rated scale (Rating scale 1 to 10 points) of college level kabaddi players comparative with non-training group college level men kabaddi players. Accordingly, combined sand surface resistance exercises and agility training protocol outcome is more than isolated sand surface resistance training and isolated sand surface agility training for upgrade the kabaddi game performance skills of college level men kabaddi players. As a result, both isolated sand surface resistance training and isolated sand surface agility training outcome produce identical affect for refine kabaddi game performance of college level men kabaddi players.

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