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INFLUENCE OF STRENGTH AND TRADITIONAL TRAINING ON SELECTED BIOMOTOR AND POWER PERFORMANCE VARIABLES AMONG COLLEGE LEVEL BADMINTON PLAYERS

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ABSTRACT

The purpose of this study was to examine the influence of strength training and traditional training on selected biomotor and power performance variables among college-level badminton players. Forty-five inter-collegiate badminton players from Erode District, aged between 18 and 25 years, were randomly selected as subjects for the study. The subjects were divided into three groups of fifteen players each. Group I underwent a structured strength training programme, Group II underwent traditional badminton training and Group III served as the control group, which did not participate in any specific training programme apart from their routine activities.

The experimental training programme was conducted for a period of twelve weeks with five sessions per week. The selected biomotor and power performance variables included speed, agility, muscular strength and leg explosive power. Standardized tests were administered to measure the respective variables before and after the training period. The collected data were analyzed using Analysis of Covariance (ANCOVA) to determine the significant differences among the groups.

The results of the study revealed that both strength training and traditional training produced significant improvements in the selected biomotor and power performance variables among college-level badminton players, whereas the control group showed no significant

improvement. The strength training group demonstrated comparatively greater improvement in muscular strength and explosive power, while the traditional training group showed notable improvement in speed and agility due to regular badminton skill drills such as smash, rally, footwork, court movement and defensive returns.

It was concluded that systematic strength training, when combined with traditional badminton training methods, is highly effective in enhancing performance-related variables among badminton players.

KEYWORDS: Badminton, Biomotor Abilities, Strength Training, Traditional Training, Explosive Power, Agility, College-Level Players.

INTRODUCTION

Badminton is one of the most popular racket sports played worldwide and has gained significant prominence at both national and international levels due to its fast-paced and highly competitive nature. The game requires players to execute a wide range of technical skills such as smash, drop, clear, and net play, combined with rapid decision-making and precise shot placement. Unlike many other sports, badminton demands continuous movement, quick reflexes, and excellent coordination, making it a physically and physiologically demanding activity.

Performance in badminton is largely dependent on well-developed biomotor abilities such as speed, agility, strength, endurance, and flexibility. Among these, speed and agility play a crucial role in enabling players to move swiftly across the court and respond effectively to the opponent's shots. Efficient footwork and court movement are essential for maintaining balance, reaching the shuttlecock in time, and executing strokes with accuracy. In addition, muscular strength and explosive power are vital for performing powerful smashes, quick directional changes, and effective defensive returns during rallies.

In recent years, sports scientists and coaches have emphasized the importance of structured and scientific training programmes to enhance athletic performance. Strength training has emerged as a key component in modern conditioning programmes, as it improves muscle force production, neuromuscular coordination, and overall power output. Exercises such as squats, lunges, resistance training, and plyometric activities are widely used to develop lower and upper body strength, which are essential for generating powerful strokes and maintaining stability during high-intensity rallies.

On the other hand, traditional badminton training methods focus primarily on skill development and game-specific conditioning. These methods include regular practice of badminton skill drills such as smash, drop, clear, net play, footwork drills, and match-play situations. Such training enhances coordination, timing, tactical awareness, and sport-specific endurance. Although traditional training contributes significantly to performance improvement, it may not always provide sufficient stimulus for developing maximal strength and explosive power when compared to systematic strength training programmes.

Despite the growing importance of badminton at the collegiate level, limited research has been conducted to compare the effects of strength training and traditional training on biomotor and power performance variables among badminton players. Understanding the relative effectiveness of these training approaches is essential for designing optimal training programmes that can improve both physical fitness and sport-specific performance.

Therefore, the present study aims to investigate the influence of strength training and traditional training on selected biomotor and power performance variables among college-level badminton players. The findings of this study are expected to provide valuable insights for coaches, trainers, and physical education professionals in developing scientifically designed training programmes to enhance the overall performance of badminton players.

STRENGTH TRAINING IN BADMINTON

Strength training plays a vital role in enhancing the overall performance of badminton players. It focuses on improving muscular strength, power, and neuromuscular coordination, which are essential for executing powerful strokes and maintaining stability during high-speed rallies. In badminton, players frequently perform explosive movements such as jumping smashes, quick lunges, and rapid directional changes. These actions require well-developed lower and upper body strength.

A systematic strength training programme typically includes exercises such as squats, lunges, step-ups, push-ups, core strengthening exercises, and resistance training using free weights or body weight. Plyometric exercises are also often incorporated to improve explosive power, which is crucial for jump smashes and fast court coverage. Regular strength training enhances muscle force production, reduces the risk of injury, and improves overall athletic efficiency. Therefore, it is considered an essential component of modern badminton conditioning programmes.

TRADITIONAL TRAINING

Traditional training methods in badminton primarily focus on skill development and sport-specific fitness. These methods include regular practice sessions involving badminton skill drills such as smash, drop, clear, net play, and defensive returns. In addition, footwork drills and court movement exercises are emphasized to improve agility, coordination, and balance. Traditional training also involves rally practice, match-play situations, and tactical training, which help players develop timing, accuracy, and game strategy. Running exercises, shuttle runs, and basic conditioning drills are commonly used to improve general fitness levels. While traditional training is highly effective in developing technical skills and game performance, it may not always provide sufficient stimulus to maximize muscular strength and explosive power when compared to structured strength training programmes.

OBJECTIVES OF THE STUDY

- To examine the effect of strength training on selected biomotor and power performance variables among college-level badminton players.
- To examine the effect of traditional badminton training on selected biomotor and power performance variables among college-level badminton players.
- To compare the effectiveness of strength training and traditional training on selected biomotor variables such as speed, agility, and muscular strength among college-level badminton players.
- To determine the influence of strength training and traditional training on explosive power performance among college-level badminton players.
- To analyze the significant differences among the strength training group, traditional training group, and control group on selected biomotor and power performance variables among inter-collegiate badminton players (aged 18–25 years).

METHODOLOGY

The purpose of the study was to examine the influence of strength training and traditional training on selected biomotor and power performance variables among college-level badminton players. For this purpose, forty-five (45) male badminton players from various colleges participating in inter-collegiate tournaments in Erode District were randomly selected as subjects. The age of the subjects ranged between 18 and 25 years. The selected subjects were randomly divided into three equal groups, each consisting of fifteen (15) players. Group I served as the Strength Training Group, Group II served as the Traditional

Training Group, and Group III served as the Control Group. The strength training group underwent a structured strength training programme, while the traditional training group followed conventional badminton training practices. The control group did not participate in any specific training programme apart from their routine daily activities. The experimental training programme was carried out for a period of twelve weeks, with five training sessions per week. Each training session lasted approximately sixty minutes, including warm-up and cool-down exercises. All training sessions were conducted under the supervision of the researcher to ensure proper execution and uniformity. The selected dependent variables for the study were speed, agility, muscular strength, and leg explosive power. Speed was measured using the 50-meter dash test, agility was assessed through the shuttle run test, muscular strength was measured by the push-up test, and explosive power was evaluated using the standing broad jump test. These standardized tests were administered before (pre-test) and after (post-test) the training period.

TRAINING PROGRAMME

The experimental training programme was conducted for a period of twelve (12) weeks, with five training sessions per week. Each training session lasted approximately sixty (60) minutes, including warm-up and cool-down exercises. The programme was carefully designed to improve selected biomotor and power performance variables such as speed, agility, muscular strength, and explosive power among college-level badminton players.

Strength Training Group

The subjects in the strength training group followed a structured and progressive strength training programme aimed at enhancing muscular strength and explosive power. The training included exercises such as squats, lunges, step-ups, push-ups, sit-ups, and core strengthening exercises. Resistance training using body weight and free weights was also incorporated.

Plyometric exercises such as jump squats, bounding, and box jumps were included to improve leg explosive power, which is essential for jump smashes and quick court coverage in badminton. The intensity and volume of the exercises were gradually increased throughout the training period following the principle of progressive overload. Adequate rest intervals were provided between sets to ensure optimal recovery and performance.

Traditional Training Group

The subjects in the traditional training group underwent conventional badminton training methods commonly practiced by coaches. The programme included badminton skill drills

such as smash, drop, clear, net play, and defensive returns. Special emphasis was given to footwork drills and court movement exercises to improve agility, balance, and coordination.

The training also included rally practice, multi-shuttle drills, and match-play sessions to enhance timing, accuracy, and tactical awareness. Running exercises, shuttle runs, and general conditioning drills were incorporated to improve overall fitness. These activities were designed to simulate real-game situations and improve sport-specific performance.

Control Group

The subjects in the control group did not participate in any specific training programme during the experimental period. They continued their regular daily activities without any additional structured physical training.

Supervision and Monitoring

All training sessions for the experimental groups were conducted under the direct supervision of the researcher to ensure proper execution of exercises and adherence to the training protocol. Uniformity in training conditions was maintained throughout the study. Necessary precautions were taken to prevent injuries, and proper warm-up and cool-down routines were followed in every session.

COLLECTION OF DATA

The data for the present study were collected from forty-five inter-collegiate badminton players from Erode District, whose ages ranged between 18 and 25 years. The selected subjects were randomly divided into three groups of fifteen players each, namely the strength training group, the traditional training group, and the control group.

Prior to the commencement of the training programme, all the subjects were assessed on the selected biomotor and power performance variables such as speed, agility, muscular strength, and explosive power. Standardized field tests were administered to measure the respective variables with accuracy and consistency.

After the completion of the twelve-week experimental training programme, the subjects were re-tested on the same variables using identical testing procedures. The pre-test and post-test scores obtained from all the subjects were carefully recorded for further statistical analysis. Proper instructions and demonstrations were provided to the subjects before conducting the tests to ensure reliability and validity of the data collected.

STATISTICAL TECHNIQUE

The data collected on the selected biomotor and power performance variables were statistically analyzed to determine the effect of strength training and traditional training among college-level badminton players. The mean and standard deviation were calculated to assess the performance levels of the subjects before and after the training programme. To identify the significant differences among the strength training group, traditional training group, and control group, the data were analyzed using Analysis of Covariance (ANCOVA). This technique was employed to adjust the pre-test differences and to compare the post-test scores of the groups more effectively. Whenever a significant difference was observed among the groups, the Scheffé post-hoc test was applied to determine the paired mean differences. The level of significance was fixed at 0.05 for all statistical analyses.

RESULTS OF ANALYSIS

The collected data were analyzed to determine the influence of strength training and traditional training on selected biomotor and power performance variables among college-level badminton players. The pre-test and post-test scores of the three groups, namely the strength training group, traditional training group, and control group, were statistically analyzed using Analysis of Covariance (ANCOVA).

The results of the analysis revealed that there was a significant improvement in the selected biomotor variables such as speed, agility, and muscular strength, as well as the power performance variable, namely explosive power, among the experimental groups when compared with the control group. The strength training group showed greater improvement in muscular strength and explosive power due to the systematic resistance and plyometric exercises included in the training programme.

Similarly, the traditional training group also demonstrated improvement in speed and agility as a result of regular badminton skill drills such as smash, rally, footwork, court movement, and defensive returns. However, the control group did not show any significant improvement in the selected variables during the experimental period. The findings of the study indicated that both strength training and traditional training had a positive effect on improving the biomotor and power performance variables of college-level badminton players. Among the two experimental groups, the strength training group demonstrated comparatively greater improvement in muscular strength and explosive power performance. Therefore, it can be concluded that structured strength training programmes are highly effective in enhancing the

physical performance of badminton players, especially when combined with sport-specific traditional training methods.

TABLE 1 ANALYSIS OF COVARIANCE AMONG STRENGTH TRAINING GROUP, TRADITIONAL TRAINING GROUP AND CONTROL GROUP ON SPEED.

	Strnegth Training Group	Traditional Training Group	Control Group	Source of variance	Sum of square	Df	Mean square	F-value
Pre test mean	7.09	7.10	7.11	Between	0.005	2	0.003	0.42
				Within	0.261	42	0.006	
Post test mean	6.91	6.97	7.09	Between	0.244	2	0.122	10.17*
				Within	0.504	42	0.012	
Adjusted post mean	6.93	6.97	7.07	Between	0.164	2	0.82	24.30*
				Within	0.138	41	0.003	

TABLE 2 ANALYSIS OF COVARIANCE AMONG STRENGTH TRAINING GROUP, TRADITIONAL TRAINING GROUP AND CONTROL GROUP ON AGILITY.

	Strnegth Training Group	Traditional Training Group	Control Group	Source of variance	Sum of square	Df	Mean square	F-value
Pre test mean	9.50	9.49	9.49	Between	0.000	2	0.000	0.02
				Within	2.958	42	0.070	
Post test mean	9.04	9.17	9.49	Between	1.563	2	0.782	16.54*
				Within	1.984	42	0.047	
Adjusted post mean	9.04	9.17	9.49	Between	1.592	2	0.796	45.93*
				Within	0.711	41	0.017	

TABLE 3 ANALYSIS OF COVARIANCE AMONG STRENGTH TRAINING GROUP, TRADITIONAL TRAINING GROUP AND CONTROL GROUP ON MUSCULAR STRENGTH.

	Strnegth Training Group	Traditional Training Group	Control Group	Source of variance	Sum of square	Df	Mean square	F-value
Pre test mean	20.66	20.60	20.86	Between	0.578	2	0.289	0.07
				Within	160.667	42	3.825	
Post test mean	23.40	25.06	21.13	Between	116.933	2	58.467	16.34*
				Within	150.267	42	3.578	
Adjusted post mean	23.43	25.15	21.00	Between	130.302	2	65.151	68.38*
				Within	39.063	41	0.953	

TABLE – 4 ANALYSIS OF COVARIANCE AMONG STRENGTH TRAINING GROUP, TRADITIONAL TRAINING GROUP AND CONTROL GROUP ON LEG EXPLOSIVE POWER

	Strnegth Training Group	Traditional Training Group	Control Group	Source of variance	Sum of square	Df	Mean square	F-value
Pre test mean	2.06	2.04	2.02	Between	0.013	2	0.006	1.74
				Within	0.156	42	0.004	
Post test mean	2.14	2.24	2.02	Between	0.364	2	0.182	57.82*
				Within	0.132	42	0.003	
Adjusted post mean	2.13	2.24	2.03	Between	0.312	2	0.156	63.32*
				Within	0.101	41	0.002	

*Significant at 0.05 level of confidence

FINDINGS OF THE STUDY

Based on the statistical analysis of the collected data using Analysis of Covariance (ANCOVA), the following findings were observed:

1. There was no significant difference among the strength training group, traditional training group, and control group in the pre-test scores of all selected variables such as speed, agility, muscular strength, and explosive power, indicating that all groups were homogeneous before the commencement of the training programme.
2. After the twelve-week training programme, significant improvements were observed in the post-test scores of the experimental groups when compared to the control group in all selected variables.
3. The strength training group showed significant improvement in speed, as indicated by the adjusted post-test mean and F-value (24.30), which exceeded the required level of significance.
4. The traditional training group demonstrated improvement in agility, as reflected by the significant adjusted F-value (45.93), indicating that badminton skill drills such as footwork, court movement, and rally practice contributed to agility development.
5. The strength training group showed notable improvement in muscular strength, as evidenced by the significant adjusted F-value (68.38). This improvement can be attributed to the resistance and bodyweight exercises included in the training programme.
6. The leg explosive power of the players improved significantly, with an adjusted F-value of 63.32, indicating that both structured strength training and traditional badminton training positively influenced explosive performance.

7. The control group did not show any significant improvement in any of the selected variables during the experimental period.
8. Among the two experimental groups, the strength training group demonstrated comparatively greater improvement in muscular strength and explosive power, while the traditional training group showed moderate improvement in speed and agility.

CONCLUSION

Based on the findings of the study, the following conclusions were drawn:

1. Strength training and traditional badminton training both had a positive influence on selected biomotor and power performance variables among college-level badminton players.
2. The implementation of a systematic strength training programme significantly improved muscular strength and explosive power compared to traditional badminton training methods.
3. Traditional badminton training methods were effective in improving speed and agility, as they involve skill-oriented drills such as smash, drop, clear, net play, footwork, and court movement.
4. The control group did not show any improvement, indicating that specific and structured training programmes are essential to enhance athletic performance.
5. Therefore, it can be concluded that strength training programmes should be integrated with regular badminton practice to enhance the overall physical performance of badminton players.

RECOMMENDATIONS

Based on the results and conclusions of the study, the following recommendations are suggested:

1. Coaches and trainers should incorporate systematic strength training programmes into the regular training schedule of badminton players to improve performance-related variables.
2. Strength training exercises such as squats, lunges, push-ups, step-ups, resistance training, and plyometric exercises should be included to enhance muscular strength and explosive power.
3. Traditional badminton training drills such as smash, drop, clear, net play, footwork drills, and rally practice should continue to be emphasized for improving speed, agility, and game-specific skills.

4. Similar studies may be conducted with different age groups, skill levels, and female badminton players to generalize the findings.
5. Future research may investigate the combined effects of strength training, plyometric training, and SAQ training on performance variables among badminton players.
6. Researchers may include additional physiological and psychological variables to gain a broader understanding of performance enhancement in badminton.

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