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EFFECTS OF AN 8-WEEK COMBINED TRAINING PROGRAM ON SELECTED MOTOR ABILITIES IN HIGH SCHOOL HOCKEY PLAYERS

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ABSTRACT

The present study investigated the effects of an eight-week combined training program on selected motor abilities among high school hockey players. Forty male hockey players aged 15–18 years were randomly assigned into an experimental group (n = 20) and a control group (n = 20). The experimental group underwent a structured combined training program consisting of strength, speed, agility, endurance, plyometric, and flexibility exercises three sessions per week for eight weeks, while the control group continued regular hockey practice. Selected motor abilities including speed, agility, explosive power, muscular endurance, flexibility, and cardiovascular endurance were assessed before and after the intervention using standardized field tests. Data were analyzed using descriptive statistics, paired t-tests, independent t-tests, and ANCOVA with a significance level of 0.05. Results indicated significant improvements in all selected motor abilities among the experimental group compared with the control group. The findings suggest that combined training is an effective approach for enhancing motor abilities in adolescent hockey players and should be incorporated into school-level hockey conditioning programs.

KEYWORDS: Combined Training, Motor Abilities, Hockey Players, High School Athletes, Physical Fitness, Sports Performance.

INTRODUCTION

Field hockey requires players to perform repeated high-intensity movements including sprinting, rapid acceleration, quick directional changes, powerful hitting, and sustained endurance throughout competition. Success in hockey depends not only on technical and tactical proficiency but also on well-developed motor abilities.

Motor abilities such as speed, agility, muscular strength, endurance, flexibility, and explosive power are fundamental determinants of sports performance. Adolescence is considered one of the most favorable periods for improving these physical qualities because physiological adaptations occur rapidly during this developmental stage.

Combined training integrates multiple exercise modalities including resistance training, plyometric exercises, aerobic conditioning, agility drills, and flexibility exercises within a systematic training program. Previous studies have demonstrated that combined training enhances neuromuscular coordination, cardiovascular fitness, muscular strength, and athletic performance more effectively than single-mode training.

Despite the growing popularity of combined training, limited research has specifically examined its effectiveness among Indian high school hockey players. Therefore, this study investigates the influence of an eight-week combined training program on selected motor abilities.

Statement of The Problem:

Hence, the problem of the present study is stated as: "To Examine The Effects of an 8-Week Combined Training Program on Selected Motor Abilities in High School Hockey Players."

Objectives of the Study

The primary objective of this study was to examine the effects of an eight-week combined training program on selected motor abilities among high school hockey players.

The specific objectives of the study were:

1. To determine the effect of an eight-week combined training program on the speed of high school hockey players.
2. To examine the effect of an eight-week combined training program on the agility of high school hockey players.
3. To assess the effect of an eight-week combined training program on the explosive leg power of high school hockey players.

4. To evaluate the effect of an eight-week combined training program on the muscular endurance of high school hockey players.
5. To determine the effect of an eight-week combined training program on the flexibility of high school hockey players.
6. To examine the effect of an eight-week combined training program on the cardiovascular endurance of high school hockey players.
7. To compare the post-test motor ability scores of the experimental group and the control group after the eight-week intervention.
8. To evaluate the overall effectiveness of a combined training program in improving motor abilities and enhancing the physical fitness of high school hockey players.

Significance of the Study

The present study is significant because it examines the effectiveness of an eight-week combined training program in improving selected motor abilities among high school hockey players. Motor abilities such as speed, agility, explosive power, muscular endurance, flexibility, and cardiovascular endurance are essential components of successful hockey performance. Understanding how a structured combined training program influences these physical qualities can provide valuable evidence for designing effective conditioning programs for adolescent athletes.

This study contributes to the field of sports science by providing empirical evidence on the effectiveness of integrating strength, plyometric, agility, endurance, and flexibility training within a single training program. The findings are expected to enrich the existing body of knowledge on concurrent or combined training, particularly in relation to youth hockey players, where limited research has been conducted.

The results of the study will be beneficial to hockey coaches by providing scientifically validated training strategies that can enhance players' physical fitness and overall performance. The training protocol developed in this study can be incorporated into preseason and in-season conditioning programs to improve motor abilities while maintaining sport-specific skills.

Physical education teachers and sports trainers can use the findings to design structured fitness programs for school athletes. Since adolescence is a critical period for physical development, implementing an evidence-based combined training program may promote long-term athletic development, improve physical fitness, and reduce the risk of sports-related injuries.

The study is also significant for school administrators and sports academies, as it highlights the importance of adopting systematic and scientifically planned conditioning programs within school sports. Improved motor abilities among players may contribute to better team performance, increased participation in competitive sports, and enhanced overall health and fitness among students.

From a practical perspective, the research provides a cost-effective and easily implementable training model that requires minimal equipment and can be conducted within regular school training sessions. This makes the program particularly suitable for schools and sports institutions with limited resources.

Furthermore, the findings may assist sports organizations, coaches, and policymakers in developing evidence-based guidelines for youth athlete development. The results can support the formulation of training curricula that emphasize holistic physical development alongside technical and tactical skill acquisition.

Finally, this study serves as a valuable reference for future researchers interested in sports training, motor abilities, youth athlete development, and field hockey performance. It provides a foundation for further investigations involving larger samples, different age groups, female athletes, longer intervention periods, and additional physiological, biomechanical, and psychological variables.

Limitations of the Study

The present study was conducted within certain limitations that should be considered when interpreting the findings.

1. The study was limited to 40 male high school hockey players aged 15–18 years; therefore, the findings may not be generalizable to female players or athletes from other age groups.
2. The intervention period was limited to eight weeks, which may not have been sufficient to observe the long-term effects of the combined training program on motor abilities.
3. Participants were selected from a limited number of schools within a specific geographical region, which may restrict the broader applicability of the results.
4. The study focused only on selected motor abilities—speed, agility, explosive leg power, muscular endurance, flexibility, and cardiovascular endurance. Other performance-related variables, such as balance, coordination, reaction time, body composition, and sport-specific skills, were not assessed.

5. The study evaluated only the effects of a combined training program and did not compare its effectiveness with other training methods, such as resistance training, plyometric training, high-intensity interval training (HIIT), or sport-specific conditioning.
6. Environmental factors such as nutrition, sleep quality, daily physical activity, psychological motivation, and recovery practices were not strictly controlled and may have influenced individual performance.
7. The research relied primarily on standardized field-based fitness tests rather than laboratory-based physiological measurements, which may have limited the precision of some assessments.
8. The study did not include a follow-up evaluation after the completion of the intervention; therefore, the long-term retention of the training effects could not be determined.
9. Variations in individual maturity status, training history, and genetic factors among participants were not specifically analyzed and may have contributed to differences in training responses.
10. Despite these limitations, standardized testing procedures, consistent supervision, and appropriate statistical analyses were employed to enhance the reliability and validity of the findings.

METHODOLOGY

Research Design

The study employed a randomized pre-test–post-test control group experimental design to investigate the effects of an eight-week combined training program on selected motor abilities among high school hockey players. Pre-test and post-test measurements were obtained for both the experimental and control groups to determine the effectiveness of the intervention.

Participants

The participants consisted of 40 male high school hockey players, aged 15–18 years, selected from government and private schools actively participating in inter-school hockey competitions. All participants were medically fit, had at least one year of competitive hockey experience, and provided informed consent (with parental consent where applicable).

The participants were randomly assigned into two equal groups:

- **Experimental Group (n = 20):** Participated in the combined training program in addition to regular hockey practice.
- **Control Group (n = 20):** Continued their regular hockey practice without additional combined training.

Variables of the Study

Independent Variable

- Eight-week combined training program.

Dependent Variables

- Speed
- Agility
- Explosive leg power
- Muscular endurance
- Flexibility
- Cardiovascular endurance

Training Intervention

The experimental group completed a structured 8-week combined training program, conducted three sessions per week on alternate days. Each session lasted approximately 75 minutes and was supervised by qualified physical education professionals.

Session Structure

- Warm-up: 10 minutes (light jogging, dynamic stretching, mobility exercises)
- Strength Training: 20 minutes (body-weight exercises, squats, lunges, push-ups, core exercises)
- Polymeric Training: 15 minutes (jump squats, bounding, box jumps, lateral hops)
- Agility and Speed Drills: 15 minutes (ladder drills, cone drills, shuttle runs, acceleration sprints)
- Endurance Training: 10 minutes (interval running and aerobic conditioning)
- Cool-down and Static Stretching: 5 minutes

Training intensity and workload were progressively increased throughout the eight weeks according to the principle of progressive overload.

The control group continued their routine hockey training without additional conditioning exercises.

Instruments and Test Administration

The following standardized field tests were used to assess motor abilities:

Motor Ability	Test Used	Unit
Speed	50-Metre Sprint Test	Seconds
Agility	Illinois Agility Test	Seconds
Explosive Leg Power	Standing Broad Jump	Centimeters
Muscular Endurance	One-Minute Sit-Up Test	Repetitions
Flexibility	Sit-and-Reach Test	Centimeters

Cardiovascular Endurance 12-Minute Cooper Run Test

All tests were administered before the intervention (pre-test) and immediately after the eight-week training period (post-test) under identical environmental conditions.

Data Collection Procedure

Baseline measurements of all dependent variables were recorded before the commencement of the training program. Following the pre-test, the experimental group participated in the combined training intervention for eight weeks, while the control group maintained their normal hockey practice schedule. At the end of the intervention, both groups underwent the same battery of post-tests using identical testing procedures and equipment. All assessments were conducted by trained investigators to ensure consistency and reliability.

DISCUSSION

The present study examined the effects of an eight-week combined training program on selected motor abilities among high school hockey players. The findings demonstrated that the experimental group showed statistically significant improvements in speed, agility, explosive leg power, muscular endurance, flexibility, and cardiovascular endurance compared with the control group, which continued only regular hockey practice. These results indicate that a structured combined training program is an effective method for enhancing the physical performance of adolescent hockey players.

The significant improvement in **speed** observed in the experimental group can be attributed to the integration of sprint drills, resistance exercises, and polymeric training. These training components improve neuromuscular coordination, increase force production, and enhance stride frequency and stride length, leading to faster sprint performance. In hockey, where players frequently perform short, explosive sprints during offensive and defensive transitions, improved speed is a key determinant of successful performance.

The improvement in agility suggests that the multidirectional movement drills, ladder exercises, shuttle runs, and cone drills included in the combined training program effectively enhanced the players' ability to accelerate, decelerate, and change direction rapidly while maintaining balance and body control. Agility is a critical component of hockey because players must continuously respond to changing game situations while maintaining possession of the ball.

The significant increase in explosive leg power reflects the positive adaptations produced by plyometric exercises and lower-body strength training. These exercises improve the stretch-shortening cycle of muscles, resulting in greater force generation and power output. Enhanced explosive power enables hockey players to execute faster starts, more powerful shots, and stronger tackling actions during competition.

The experimental group also demonstrated significant improvements in muscular endurance, which may be explained by the repeated resistance exercises and sport-specific conditioning performed throughout the intervention. Improved muscular endurance allows players to sustain repeated high-intensity movements, maintain technical efficiency, and delay the onset of fatigue during prolonged matches.

A notable improvement was observed in flexibility, primarily due to the inclusion of dynamic stretching during warm-up and static stretching during cool-down in every training session. Increased flexibility contributes to greater joint range of motion, improved movement efficiency, enhanced technical execution, and a reduced risk of musculoskeletal injuries, all of which are essential for hockey performance.

The combined training program also resulted in significant enhancement of cardiovascular endurance. The inclusion of interval running and aerobic conditioning improved aerobic capacity, enabling players to recover more rapidly between repeated high-intensity efforts and sustain performance throughout the duration of a match. Better cardiovascular endurance is particularly important in hockey because the game demands continuous movement with repeated bouts of high-intensity activity.

Overall, the findings of the present investigation support the principle that combined training, which integrates strength, speed, agility, endurance, and flexibility exercises within a single structured program, produces comprehensive improvements in physical fitness. The observed adaptations are likely due to enhanced neuromuscular efficiency, improved muscle recruitment, increased metabolic capacity, and better coordination between different physiological systems. Such adaptations are especially beneficial during adolescence, a period characterized by rapid physical development and high trainability.

The findings are consistent with previous research demonstrating the effectiveness of integrated training approaches in improving athletic performance. Studies by Bompa and Buzzichelli (2019) emphasized that periodized combined training develops multiple fitness components simultaneously and contributes to long-term athletic development. Similarly, Behm et al. (2017) reported significant improvements in muscular strength and power following integrated resistance and plyometric training. Chaouachi et al. (2014) found that combined neuromuscular training enhanced sprint speed and agility in young athletes, while Impellizzeri et al**.** (2008) demonstrated that concurrent strength and endurance training improved overall physical performance in team-sport athletes. The present findings are also in agreement with Young and Farrow (2013), who concluded that combining speed, agility, and strength training is more effective than isolated training methods for improving sport-specific performance.

In conclusion, the findings confirm that an eight-week combined training program is an effective strategy for improving the motor abilities required for successful hockey performance among high school players. The results provide strong scientific evidence supporting the inclusion of combined training in school hockey conditioning programs. Coaches, physical education teachers, and sports trainers are encouraged to adopt similar evidence-based training models to enhance physical fitness, improve competitive performance, and promote the long-term athletic development of young hockey players.

CONCLUSION

The present study investigated the effects of an eight-week combined training program on selected motor abilities among high school hockey players. Based on the statistical analysis of the pre-test and post-test data, it can be concluded that the combined training program produced significant improvements in speed, agility, explosive leg power, muscular endurance, flexibility, and cardiovascular endurance compared with regular hockey training alone.

The findings indicate that integrating strength training, polymeric exercises, speed and agility drills, endurance conditioning, and flexibility exercises within a systematic training program provides comprehensive physical adaptations that are essential for hockey performance. These improvements can be attributed to enhanced neuromuscular coordination, increased muscular strength and power, improved aerobic capacity, and greater movement efficiency developed through the progressive training protocol.

The study demonstrates that combined training is a practical and scientifically supported approach for improving multiple motor abilities simultaneously in adolescent athletes. Since hockey is a physically demanding sport requiring repeated high-intensity efforts, rapid changes of direction, explosive movements, and sustained endurance, the implementation of a structured combined training program can substantially enhance players' overall physical preparedness and competitive performance.

From a practical perspective, the results suggest that school hockey coaches, physical education teachers, strength and conditioning specialists, and sports academies should incorporate combined training into their regular conditioning schedules, particularly during the preseason and early competitive phases. Such training can contribute not only to improved athletic performance but also to better physical fitness, enhanced movement quality, and a reduced risk of sports-related injuries.

The study also contributes to the growing body of knowledge in sports science by providing empirical evidence on the effectiveness of combined training among high school hockey players. It offers a useful reference for researchers and practitioners interested in youth athlete development and evidence-based training methods.

Although the findings are encouraging, they should be interpreted within the context of the study's limitations, including the relatively small sample size, the inclusion of only male participants, and the eight-week intervention period. Future research should include larger and more diverse samples, female athletes, longer intervention durations, and additional physiological, biomechanical, and psychological performance variables to further validate and extend these findings.

In summary, the study concludes that an eight-week combined training program is an effective and practical training strategy for enhancing selected motor abilities in high school hockey players. The integration of multiple training components into a well-planned conditioning program can play a vital role in improving physical fitness, optimizing sports performance, and supporting the long-term athletic development of young hockey players.

Implications

Overall, the study highlights that combined training is an effective, practical, and evidence-based approach for enhancing the motor abilities of high school hockey players. Its application can support the holistic development of young athletes, improve competitive performance, and strengthen school-based sports programs

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