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IMPACT OF HIGH INTENSITY AND LOW INTENSITY INTERVAL TRAINING CAPSULES ON MOTOR FITNESS AMONG INTER COLLEGIATE LEVEL VOLLEYBALL PLAYERS

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Abstract:

Motor fitness is a key determinant of athletic performance, especially in dynamic sports such as volleyball, where players must consistently demonstrate agility, flexibility, speed, and coordination. Among these components, flexibility plays an important role in enabling efficient movement patterns, improving range of motion, and reducing the risk of injuries during training and competition. The purpose of this study was to examine the effects of high-intensity interval training (HIIT) and low-intensity interval training (LIIT) on selected components of motor fitness among intercollegiate male volleyball players. A total of 45 male football players from Aditya College of Engineering, aged 18 to 25 years, were selected as participants for the study. The subjects were randomly assigned to experimental groups and a control group and underwent structured HIIT and LIIT training protocols over a specified training period. Flexibility was the primary motor fitness variable assessed in this study. Pre-test and post-test data were collected using standardized field-based tests. The collected data were analyzed using appropriate inferential statistical techniques to determine the effectiveness of the training interventions. The results revealed that both HIIT and LIIT programs produced significant improvements in motor fitness components among the participants. However, HIIT resulted in a greater improvement in flexibility compared to LIIT. It was concluded that interval training, particularly high-intensity protocols, is an effective method for enhancing motor fitness among collegiate athletes. Accordingly, it is recommended that coaches and physical education professionals incorporate HIIT into regular training schedules to optimize performance outcomes.

Key Words: High-Intensity Interval Training (HIIT) and Low-Intensity Interval Training

Introduction:

Motor fitness is a key determinant of athletic performance, especially in dynamic sports such as volleyball, where players must consistently demonstrate agility, flexibility, speed, and coordination. Among these components, flexibility plays an important role in enabling efficient movement patterns, improving range of motion, and reducing the risk of injuries during training and competition. In recent years, interval training has become a widely adopted method in sports conditioning due to its efficiency in improving physical fitness within relatively short training durations. High-Intensity Interval Training (HIIT) involves repeated bouts of high-effort exercise followed by short recovery periods, whereas Low-Intensity Interval Training (LIIT) consists of longer durations of moderate or low-intensity activity with structured rest intervals. Both training methods are considered effective for enhancing overall fitness, though their specific influence on motor fitness components requires further investigation.

While previous research has highlighted the benefits of interval training on cardiovascular endurance, strength, and general fitness, limited studies have examined its effects on flexibility among collegiate volleyball players. This gap highlights the need to compare the effectiveness of HIIT and LIIT in improving motor fitness components in this population. Therefore, the present study aims to investigate and compare the effects of HIIT and LIIT on selected components of motor fitness, with a particular focus on flexibility, among intercollegiate male volleyball players.

Methods and Materials:

The present study was designed to investigate the effects of high-intensity interval training (HIIT) and low-intensity interval training (LIIT) on selected components of motor fitness among intercollegiate male volleyball players. An experimental research design was adopted for this study. A total of 45 male volleyball players from Aditya College of Engineering, aged between 18 and 25 years, were selected as subjects. The participants were randomly assigned into experimental groups and a control group. The experimental groups underwent structured HIIT and LIIT training protocols, while the control group continued with their regular training routine without any additional intervention.

The training program was conducted over a specified duration, with carefully designed HIIT and LIIT sessions aimed at improving motor fitness components. Flexibility was chosen as the primary variable for assessment. Standardized field-based tests were used to collect pre-test and post-test data from all participants before and after the training period. The collected data were analyzed using appropriate inferential statistical techniques to determine the significance of differences between pre-test and post-test scores, as well as to compare the effectiveness of HIIT and LIIT interventions on motor fitness outcomes.

Research Design:

The present study employed a true experimental research design to examine the effects of high-intensity interval training (HIIT) and low-intensity interval training (LIIT) on selected components of motor fitness among intercollegiate male volleyball players. A pre-test and post-test randomized group design was used for the investigation.

The selected participants were randomly assigned into experimental groups and a control group to ensure equality among groups at the initial stage. The experimental groups underwent structured HIIT and LIIT training interventions, while the control group continued with their regular training routine without any additional treatment. This design enabled the researcher to assess the changes in motor fitness components, particularly flexibility, resulting from the training interventions. The pre-test and post-test measurements facilitated the comparison of performance within and between groups, thereby helping to determine the effectiveness of HIIT and LIIT programs on the selected variables.

Training Protocol:

The training protocol for the present study was designed to implement structured High-Intensity Interval Training (HIIT) and Low-Intensity Interval Training (LIIT) programs for intercollegiate male volleyball players. The intervention was carried out over a specified training period with carefully planned exercise sessions. The HIIT group performed short bursts of high-intensity exercises followed by brief recovery periods. The intensity of work phases was maintained at a high level, with activities such as sprinting, agility drills, and plyometric movements incorporated into the sessions. The recovery intervals were kept short to maintain elevated physiological demand throughout the training session.

The LIIT group performed exercises at a lower intensity with comparatively longer work durations and moderate recovery periods. The activities included light jogging, basic movement drills, and controlled aerobic exercises designed to maintain steady but sub-maximal effort levels. Both training groups followed a structured schedule, with sessions conducted on alternate days under supervision to ensure proper execution and safety. The control group did not participate in any additional training interventions apart from their regular physical education or sports practice routine. The overall training protocol was designed to systematically compare the effects of HIIT and LIIT on motor fitness components, particularly flexibility, among the selected participants.

Statistical Technique:

The data collected for the present study were analyzed using appropriate inferential statistical techniques to determine the effectiveness of high-intensity interval training (HIIT) and low-intensity interval training (LIIT) on selected components of motor fitness among intercollegiate male volleyball players. Descriptive statistics such as mean and standard deviation were used to summarize the pre-test and post-test scores of the selected variables. To assess the significance of differences within and between the groups, a paired sample t-test was applied for intra-group comparisons (pre-test vs. post-test), while an independent sample t-test was used for inter-group comparisons among HIIT, LIIT, and control groups.

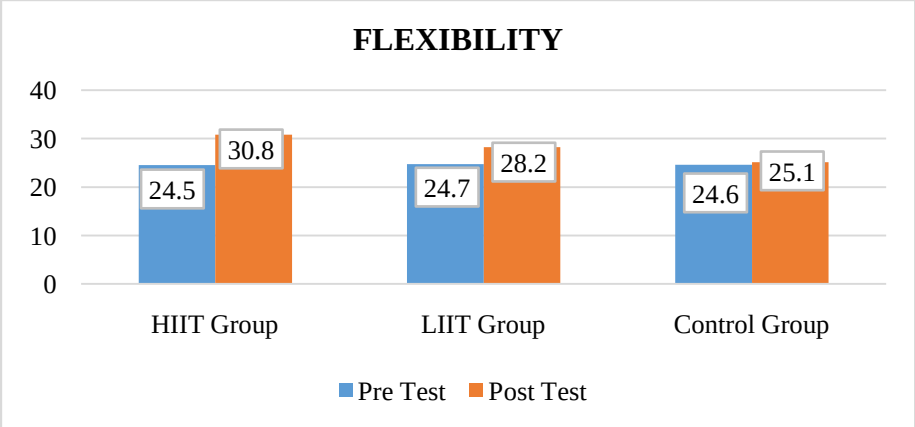
The level of significance was set at 0.05 to test the hypotheses formulated in the study. The statistical analysis helped in determining whether the observed changes in motor fitness components were statistically significant or occurred by chance due to the training interventions.

Results and Discussions:

Table 1: Paired T-Test Analysis of Flexibility

Groups	Pre-Test Mean	Post-Test Mean	Mean Difference	Standard Deviation	t-value
HIIT Group	24.5	30.8	6.3	1.20	12.85*
LIIT Group	24.7	28.2	3.5	1.10	9.42*
Control Group	24.6	25.1	0.5	0.90	1.02

Figure I: Clustered Column Chart Illustrating the Pretest and Post-Test Mean Values of the High-Intensity Interval Training Group (HIIT) Low-Intensity Interval Training Group (LIIT) and Control Group on Flexibility



Interpretation of Results:

The results of the study indicate that the HIIT group showed a marked and statistically significant improvement in flexibility from pre-test (24.5) to post-test (30.8), with a mean difference of 6.3 and a high t-value of 12.85. This clearly suggests that high-intensity interval training had a strong positive effect on enhancing flexibility among the participants. Similarly, the LIIT group also demonstrated a significant improvement in flexibility, with pre-test and post-test means of 24.7 and 28.2 respectively, and a mean difference of 3.5. The obtained t-value of 9.42 confirms that low-intensity interval training was also effective in improving flexibility, though the magnitude of improvement was lower compared to HIIT.

In contrast, the control group showed only a minimal increase in flexibility (24.6 to 25.1), with a mean difference of 0.5 and a t-value of 1.02, which is below the required level of significance. This indicates that without structured training intervention, no significant improvement in flexibility occurred. Overall, the findings suggest that both HIIT and LIIT are effective in improving flexibility, but HIIT produces greater gains compared to LIIT, while the control group shows no significant change.

Conclusion:

Based on the findings of the present study, it can be concluded that both high-intensity interval training (HIIT) and low-intensity interval training (LIIT) are effective methods for improving flexibility among intercollegiate male volleyball players. However, HIIT was found to be more effective in producing greater improvements compared to LIIT. The experimental results clearly showed that the HIIT group demonstrated the highest level of improvement in flexibility, followed by the LIIT group, while the control group showed no significant change. This confirms that structured interval training has a positive impact on motor fitness components, particularly flexibility, whereas regular training without specific intervention does not lead to significant enhancement. Therefore, it is concluded that HIIT is a more efficient training method than LIIT for developing flexibility in collegiate volleyball players. Coaches and physical education professionals are recommended to incorporate HIIT-based training programs into regular practice schedules to achieve better performance outcomes and improved motor fitness.

Recommendations:

Based on the findings of the present study, the following recommendations are made:

- Coaches and physical education professionals are advised to incorporate high-intensity interval training (HIIT) into regular training schedules, as it has shown greater effectiveness in improving flexibility among intercollegiate volleyball players.
- Low-intensity interval training (LIIT) may also be used as a supportive training method, especially during recovery phases or for beginners, as it still contributes to improvements in motor fitness.
- Structured interval training programs should be implemented consistently to ensure continuous development of flexibility and other motor fitness components.
- Proper warm-up and cool-down routines should be included in all training sessions to enhance performance and reduce the risk of injuries.
- Future training programs should consider combining HIIT and LIIT to balance intensity and recovery for optimal performance development.
- Further studies may be conducted on a larger sample size and across different sports disciplines to generalize the findings more effectively.

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