

FLEXIBILITY ENHANCEMENT THROUGH HIGH-INTENSITY RESISTANCE TRAINING: A STUDY ON STATE-LEVEL BODYBUILDERS IN MADHUBANI DISTRICT, BIHAR

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Abstract:

This research was conducted to find out whether high-intensity resistance training (HIRT) improves flexibility in bodybuilders. It is commonly believed that resistance training decreases flexibility, but some modern research challenges this view. This study aimed to examine if flexibility improves when bodybuilders follow a properly designed high-intensity training program. A total of 60 male bodybuilders between 18 and 28 years of age, all of whom had participated at the state level, were selected from Madhubani District, Bihar. The participants were engaged in an 8-week structured HIRT program. Their flexibility was tested before and after the training using the Sit-and-Reach Test. The results showed a significant improvement in flexibility after the 8-week training period. The study concludes that high-intensity resistance training, when performed with proper technique and full range of motion, can increase flexibility along with strength.

Keywords: *Flexibility, Resistance Training, High-Intensity Training, Bodybuilders, Sit-and-Reach Test, Strength, Bihar.*

1. Introduction

Flexibility is one of the key components of physical fitness. It is defined as the ability of a joint or series of joints to move through a full range of motion. For athletes, particularly bodybuilders, flexibility plays an important role in muscle performance, injury prevention, posture improvement, and overall athletic performance.

Traditionally, many athletes and coaches have believed that resistance training leads to stiff muscles and reduced flexibility. However, recent studies have shown that this is not always

true. In fact, when resistance training is done with a proper range of motion, it can improve flexibility. For example, exercises like deep squats, lunges, and Romanian deadlifts stretch the muscles and joints under load, which may increase muscle elasticity.

High-intensity resistance training (HIRT) is a training style where exercises are performed with heavy weights (around 75–85% of one's maximum capacity) and fewer repetitions. This training builds muscular strength, power, and endurance. But its effects on flexibility are still under-researched in the Indian context, especially in rural areas like Madhubani district in Bihar.

This study aims to explore whether state-level bodybuilders from Madhubani experience any change in their flexibility when following a structured HIRT program for eight weeks.

2. Objectives of the Study

The main objectives of the study were:

- To measure the flexibility level of state-level bodybuilders before beginning the HIRT program.
- To implement an 8-week high-intensity resistance training program.
- To reassess their flexibility levels after the training period.
- To determine whether any significant improvement in flexibility occurs due to the training.
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3. Review of Literature

Many researchers have studied the relationship between resistance training and flexibility. According to Behm and Chaouachi (2011), dynamic exercises with a full range of motion can increase flexibility when compared to static stretching alone.

Similarly, Schoenfeld (2010) emphasized the importance of full-range exercises in promoting both muscle growth and flexibility.

Morton et al. (2016) noted that intensity and range of movement are two critical factors that affect the body's adaptation to training. In bodybuilding, although the primary goal is muscle hypertrophy and definition, flexibility should not be ignored, as it contributes to better performance and reduced risk of injury.

Kruse et al. (2015) Kruse and colleagues conducted a study to observe how resistance training affects flexibility in older adults. They found that when strength training includes full-range

movements, it leads to improvements in flexibility that are equal to or better than traditional static stretching programs. Their findings support the idea that flexibility is not only preserved but can also be enhanced through resistance exercises when performed correctly.

Fatouros et al. (2006) Fatouros and his team compared the effects of low- and high-intensity resistance training on functional capacity and flexibility in healthy men. Their research concluded that high-intensity training produced more notable improvements in strength without negatively affecting flexibility. This supports the claim that HIRT, when well-planned, benefits overall physical performance, including flexibility.

Afonso et al. (2021) In a more recent study, Afonso and colleagues reviewed 26 trials on resistance training and flexibility. They concluded that resistance training, especially involving eccentric and full-range motions, consistently improved joint mobility. The study also emphasized that isolated stretching routines may not be necessary for improving flexibility if strength training is already well-structured.

4. Methodology

4.1 Participants

A total of 60 male bodybuilders from Madhubani district, Bihar, were selected. All participants were aged between 18 and 28 years and had participated in at least one state-level bodybuilding competition. They were selected using purposive sampling. All participants had basic experience in weight training but had not followed any structured high-intensity program in the past three months.

4.2 Training Program

The participants were trained for 8 weeks under a structured HIRT program, supervised by certified physical trainers. Training was done 4 days a week, and each session lasted about 60 minutes. Key exercises included:

- Barbell Squats
- Deadlifts
- Bench Press
- Pull-Ups
- Military Press
- Barbell Rows

Each exercise was performed for 3–4 sets of 6–8 reps using 75–85% of the individual’s one-repetition maximum (1RM). Rest intervals between sets were 60–90 seconds. A full range of motion was strictly maintained throughout the training program.

4.3 Flexibility Testing

Flexibility was assessed using the **Sit-and-Reach Test**, a widely accepted method for measuring hamstring and lower back flexibility.

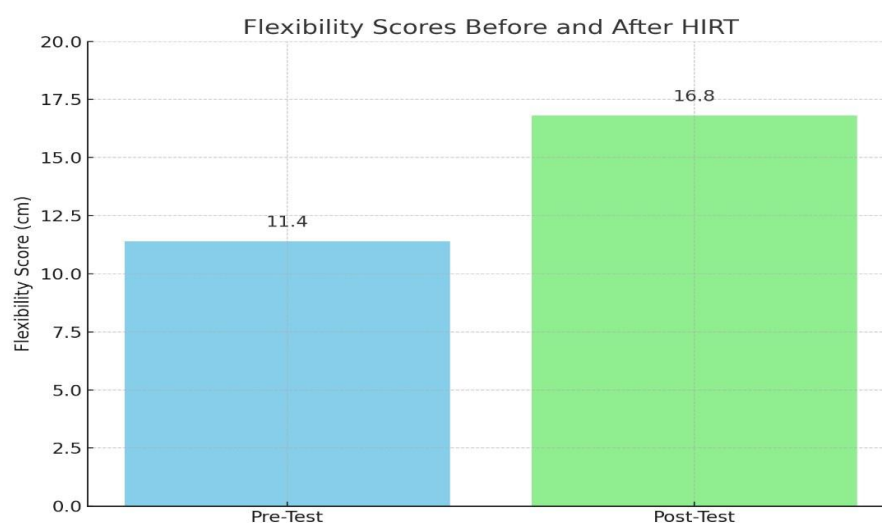
- Pre-test was conducted one day before the start of the training program.
- Post-test was conducted after the completion of 8 weeks.

4.4 Data Collection and Analysis

The mean and standard deviation of pre- and post-test scores were calculated. A paired sample *t*-test was used to assess the significance of the difference between pre- and posttest scores. A significance level of $p < 0.05$ was considered for analysis.

5. Results

Flexibility Scores (Sit-and-Reach Test)	Mean (cm)	Standard Deviation
Pre-Test	11.4	2.3
Post-Test	16.8	2.1



The results showed a **mean increase of 5.4 cm** in flexibility after the 8-week training program. The *t*-test revealed that this difference was statistically significant at **p < 0.01**, indicating that the improvement in flexibility was not due to chance.

6. Discussion

The results of this study strongly suggest that high-intensity resistance training can improve flexibility if exercises are performed with a full range of motion. While many believe that strength training makes muscles stiff, this study proves otherwise.

When movements like squats and deadlifts are done correctly, they stretch and strengthen the muscles at the same time. This dynamic movement helps the body maintain or even improve flexibility.

Additionally, the use of compound movements (exercises involving multiple joints) might have played an important role in improving functional flexibility. The participants also reported fewer muscle stiffness issues after the 8-week training period, which supports the idea that strength and flexibility are not opposites but can complement each other.

These findings are important for coaches, trainers, and athletes who often focus only on strength or hypertrophy and ignore flexibility. This study proves that both goals can be achieved simultaneously with proper training design.

7. Conclusion

The study concludes that high-intensity resistance training can significantly improve flexibility in trained bodybuilders. The positive changes in sit-and-reach test scores show that proper strength training can stretch and strengthen muscles at the same time. Coaches and trainers should therefore consider incorporating high-intensity full-range movements into regular bodybuilding routines to gain both strength and flexibility.

8. Recommendations

- Trainers should teach correct posture and full range of motion during resistance training.
- Bodybuilders should perform compound lifts like squats and deadlifts to improve flexibility.
- Warm-up and cool-down stretching exercises should be added to every training session.

- More studies should be done with female athletes and other age groups to see if the same results apply.
- Psychological and injury-related benefits of flexibility in bodybuilders should also be researched.

9. Limitations of the Study

- Only male participants were included.
- The study was limited to one district (Madhubani, Bihar).
- Only one flexibility test was used (Sit-and-Reach).
- Long-term effects of the training were not studied.

References :

- Behm, D. G., & Chaouachi, A. (2011). A review of the acute effects of static and dynamic stretching on performance. *European Journal of Applied Physiology*, 111(11), 2633–2651.
- Morton, R. W., Oikawa, S. Y., & Phillips, S. M. (2016). Strength training and muscle hypertrophy: The importance of load. *Journal of Strength and Conditioning Research*, 30(1), 23–31.
- Schoenfeld, B. J. (2010). The mechanisms of muscle hypertrophy and their application to resistance training. *Journal of Strength and Conditioning Research*, 24(10), 2857–2872.
- Simão, R., et al. (2011). Influence of strength, flexibility, and simultaneous training on flexibility and strength gains. *Journal of Strength and Conditioning Research*, 25(5), 1333–1338.
- ACSM (2018). *ACSM's Guidelines for Exercise Testing and Prescription* (10th ed.). Wolters Kluwer.
- Afonso, J., Rocha, T., Nikolaidis, P. T., Clemente, F. M., & Silva, A. F. (2021). Effects of strength training on flexibility in healthy adults: A systematic review. *Journal of Sports Science & Medicine*, 20(4), 664–673.
- Fatouros, I. G., Kambas, A., Katrabasas, I., Nikolaidis, K., & Taxildaris, K. (2006). Strength training and detraining effects on muscular performance in elderly women are intensity dependent. *British Journal of Sports Medicine*, 40(10), 744–748.
- Kruse, N. T., Scheuermann, B. W., & Chae, H. W. (2015). Influence of resistance training on flexibility in older adults: A meta-analysis. *Journal of Aging and Physical Activity*, 23(3), 418–429.