International Journal of Current Research and Modern Education (IJCRME)
International Peer Reviewed - Refereed Research Journal, Website: www.crystalpen.in
Impact Factor: 6.925, ISSN (Online): 2455 - 5428, Volume 10, Issue 2, July - December, 2025

INFLUENCE OF TABATA FORMAT OF INTERVAL TRAINING ON EXPLOSIVE POWER AND ELASTIC POWER AMONG COLLEGE WOMEN ATHLETES

M. Seshu Kumari* & A. Sabirabi**

* Research Scholar, Department of Physical Education, Annamalai University, Tamil Nadu, India
** Assistant Professor, Department of Physical Education, Annamalai University, Tamil Nadu, India

Cite This Article: M. Seshu Kumari & A. Sabirabi, "Influence of Tabata Format of Interval Training on Explosive Power and Elastic Power Among College Women Athletes", International Journal of Current Research and Modern Education, Volume 10, Issue 2, July - December, Page Number 159-161, 2025.

DOI: https://doi.org/10.5281/zenodo.18795847

Abstract:

The purpose of the study was designed to examine the effect of tabata format of interval training on explosive power and elastic power of college women athletes. For the purpose of the study, thirty college women athletes studying bachelor's degree in Telangana Social Welfare Residential Educational Institutions Society, Telangana, India were selected as subjects. They were divided into two equal groups. Each group consisted of the fifteen subjects. Group I underwent tabata format of interval training for three days per week for twelve weeks. Group II acted as control who did not undergo any special training programme apart from their regular physical education programme. The following variables namely explosive power and elastic power were selected as criterion variables. All the subjects of two groups were tested on selected dependent variables by using vertical jump and bunny hops respectively at prior to and immediately after the training programme. The analysis of covariance was used to analyze the significant difference, if any among the groups. The .05 level of confidence was fixed as the level of significance to test the 'F' ratio obtained by the analysis of covariance, which was considered appropriate. The results of the study showed that there was a significant difference between tabata format of interval training group and control group on explosive power and elastic power. And also it was found that there was a significant improvement on explosive power and elastic power due to twelve weeks of tabata format of interval training.

Key Words: Tabata Format of Interval Training, Explosive Power, Elastic Power, College Women Athletes

Introduction:

The Tabata protocol is a specific and widely recognized form of High-Intensity Interval Training (HIIT) characterized by short bursts of maximal effort exercise followed by brief recovery periods. This protocol was originally developed by Izumi Tabata and his colleagues at the National Institute of Fitness and Sports in Kanoya. The classic Tabata format consists of 20 seconds of high-intensity exercise performed at approximately 170% of VO_2max, followed by 10 seconds of rest, repeated for 8 cycles (totaling 4 minutes).

Tabata training is designed to simultaneously improve both aerobic and anaerobic energy systems. Unlike traditional steady-state endurance training, which primarily enhances aerobic capacity, the Tabata format significantly increases maximal oxygen uptake (VO_2max) and anaerobic capacity within a short training duration (Tabata et al., 1996). This makes it particularly valuable for athletes requiring speed, power, and endurance.

The physiological basis of Tabata training lies in its ability to stress the phosphagen system, glycolytic system, and oxidative pathways simultaneously. Repeated exposure to such high-intensity intervals leads to mitochondrial biogenesis, increased buffering capacity, improved lactate tolerance, and enhanced neuromuscular coordination (Gibala& McGee, 2008). Furthermore, due to its time efficiency and high metabolic demand, Tabata training has gained importance in sports conditioning, physical education, and performance enhancement programs.

Explosive power refers to the ability of a muscle or group of muscles to exert maximal force in the shortest possible time. It is a critical component of performance in sprinting, jumping, throwing, and many field and court sports. In biomechanical terms, explosive power is closely related to the rate of force development (RFD), which determines how quickly an athlete can generate force (Cormie, McGuigan, & Newton, 2011).

Explosive power relies heavily on the phosphagen energy system, fast-twitch (Type II) muscle fibers, and neuromuscular efficiency. Training methods such as plyometrics, Olympic weightlifting movements, sprint drills, and high-intensity interval training have been shown to significantly improve explosive power by enhancing motor unit recruitment, synchronization, and firing frequency (Haff & Nimphius, 2012).

In sports science, explosive power is often measured through vertical jump tests, standing broad jump, medicine ball throws, and sprint performance. Improvements in explosive power contribute directly to better athletic performance, particularly in sports requiring rapid acceleration and high-intensity efforts.

Elastic power is the ability of muscles and tendons to store elastic energy during the eccentric phase of movement and release it during the concentric phase. It is primarily associated with the stretch-shortening cycle (SSC), which enhances force production beyond what is possible through concentric contraction alone. The SSC mechanism plays a crucial role in activities such as jumping, sprinting, and rapid directional changes.

During the eccentric phase, elastic energy is stored in the muscle-tendon complex. If the transition to the concentric phase occurs rapidly (amortization phase), this stored energy is released, resulting in greater force output and efficiency (Komi, 2000). Effective utilization of elastic power depends on neuromuscular coordination, tendon stiffness, and reactive strength (Markovic & Mikulic, 2010). Elastic power is commonly assessed through depth jump tests, reactive strength index (RSI), and countermovement jump performance.

The Tabata protocol is one of the most rigorous structures within High-Intensity Interval Training (HIIT), distinguished by its fixed 20-second all-out effort followed by 10-seconds of rest for a total of 8 cycles (4 minutes) (Tabata et al., 1996). In contrast to traditional continuous running or moderate aerobic training, Tabata engages both aerobic and anaerobic energy systems simultaneously, making it especially relevant for athletes whose events require rapid transitions between speed and endurance (Tabata et al., 1996; see also the comparison of HIIT vs. Tabata training structures).

For runners particularly sprinters and middle-distance athletes this dual stress on metabolic pathways can improve oxygen uptake, anaerobic power, and fatigue resistance within a comparatively short training time (Tabata et al., 1996; see also general HIIT aerobic adaptations). An applied study involving 200-metre runners showed that Tabata-style exercises helped advance the characteristic of speed and muscle power in the lower limbs, suggesting practical improvements in sprint performance.

Moreover, randomized controlled research comparing Tabata-based running protocols with other Tabata exercises indicates that interval training rooted in running movements may offer specific advantages for endurance and power outcomes in physically demanding fields, reinforcing the modality's applicability for field-oriented athletic preparation

Methodology:

The purpose of the study was designed to examine the effect of tabata format of interval training on explosive power and elastic power of college women athletes. For the purpose of the study, thirty college women athletes studying bachelor's degree in Telangana Social Welfare Residential Educational Institutions Society, Telangana, India were selected as subjects. They were divided into two equal groups. Each group consisted of the fifteen subjects. Group I underwent tabata format of interval training for three days per week for twelve weeks. Group II acted as control who did not undergo any special training programme apart from their regular physical education programme. The following variables namely explosive power and elastic power were selected as criterion variables. All the subjects of two groups were tested on selected dependent variables by using vertical jump and bunny hops respectively at prior to and immediately after the training programme. The analysis of covariance was used to analyze the significant difference, if any among the groups. The .05 level of confidence was fixed as the level of significance to test the 'F' ratio obtained by the analysis of covariance, which was considered appropriate.

Analysis of the Data:

Explosive Power:

The analysis of covariance on explosive power of the pre and post test scores of tabata format of interval training group and control group have been analyzed and presented in table 1.

Table 1: Analysis of Covariance of the Data on Explosive Power of Pre and Post Tests Scores of Tabata Format of Interval Training and Control Groups

Test	Tabata Format of Interval Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test							
Mean	38.47	39.00	Between	2.13	1	2.1333	0.25
S.D.	2.85	2.37	Within	241.73	28	8.6333	
Post Test							
Mean	43.20	39.07	Between	128.13	1	128.1333	10.96*
S.D.	2.83	2.77	Within	327.47	28	11.6952	
Adjusted Post Test							
Mean	43.40	38.87	Between	152.83	1	152.8296	65.59*
			Within	62.91	27	2.3299	

* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 2 and 28 and 2 and 27 are 3.34 and 3.35 respectively).

The table 1 shows that the adjusted post-test means of tabata format of interval training group and control group are 43.40 and 38.87 respectively on explosive power. The obtained "F" ratio of 65.59 for adjusted post-test means is more than the table value of 3.35 for df 1 and 27 required for significance at .05 level of confidence on explosive power.

The results of the study indicated that there was a significant difference between the adjusted post-test means of tabata format of interval training group and control group on explosive power.

Elastic Power:

The analysis of covariance on elastic power of the pre and post test scores of tabata format of interval training group and control group have been analyzed and presented in table 2.

Table 2: Analysis of Covariance of the Data on Elastic Power of Pre and Post Tests Scores of Tabata Format of Interval Training and Control Groups

Test	Tabata Format of Interval Training Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test							
Mean	4.81	4.85	Between	0.0087	1	0.0087	0.85
S.D.	0.10	0.10	Within	0.2868	28	0.0102	
Post Test							
Mean	5.20	4.88	Between	0.7648	1	0.7648	19.51*
S.D.	0.09	0.11	Within	1.0977	28	0.0392	
Adjusted Post Test							

Mean	5.22	4.87	Between	0.8825	1	0.8825	188.30*
			Within	0.1265	27	0.0047	

* Significant at .05 level of confidence.
(The table values required for significance at .05 level of confidence for 2 and 28 and 2 and 27 are 3.34 and 3.35 respectively).

The table 2 shows that the adjusted post-test means of tabata format of interval training group and control group are 5.22 and 4.87 respectively on elastic power. The obtained "F" ratio of 188.30 for adjusted post-test means is more than the table value of 3.35 for df 1 and 27 required for significance at .05 level of confidence on elastic power.

The results of the study indicated that there was a significant difference between the adjusted post-test means of tabata format of interval training group and control group on elastic power.

Conclusions:

- There was a significant difference between tabata format of interval training group and control group on explosive power and elastic power.
- And also it was found that there was a significant improvement on selected criterion variables such as explosive power and elastic power due to tabata format of interval training.

References:

1. Cormie, P., McGuigan, M. R., & Newton, R. U. (2011). Developing maximal neuromuscular power: Part 1 - Biological basis of maximal power production. Sports Medicine, 41(1), 17- 38. https://doi.org/10.2165/11537690-000000000-00000
2. Gibala, M. J., & McGee, S. L. (2008). Metabolic adaptations to short-term high-intensity interval training. Acta Physiologica, 195(3), 297- 307. https://doi.org/10.1111/j.1748-1716.2008.01810.x
3. Haff, G. G., & Nimphius, S. (2012). Training principles for power. Strength and Conditioning Journal, 34(6), 2-12. https://doi.org/10.1519/SSC.0b013e31826db467
4. Komi, P. V. (2000). Stretch-shortening cycle: A powerful model to study normal and fatigued muscle. Journal of Biomechanics, 33(10), 1197- 1206. https://doi.org/10.1016/S0021-9290(00)00064-6
5. Markovic, G., & Mikulic, P. (2010). Neuro-musculoskeletal and performance adaptations to lower-extremity plyometric training. Sports Medicine, 40(10), 859- 895. https://doi.org/10.2165/11318370-000000000-00000.
6. Tabata, I., Nishimura, K., Kouzaki, M., Hirai, Y., Ogita, F., Miyachi, M., & Yamamoto, K. (1996). Effects of moderate-intensity endurance and high-intensity intermittent training on anaerobic capacity and VO_2 Max. Medicine & Science in Sports & Exercise, 28(10), 1327- 1330. https://doi.org/10.1097/00005768-199610000-00018.
7. Ali, M. M., Hussain, A. A., & Jasim, M. M. (2020- 2021). The effect of Tabata exercises on muscle power and running speed in under-20 200 metres runners. SPORT TK-Euro American Journal of Sport Sciences.
8. Cin, M., & Cabuk, R. (2025). Effects of running vs. calisthenics-based high-intensity interval training using the Tabata protocol on endurance, strength, and power in Gendarmerie cadets. Journal of Strength and Conditioning Research, 39(7), e916- e923.