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MODEL OF PLYOMETRIC TRAINING IN THE COMPETITION PERIOD OF BADMINTON PLAYERS

Notes

Rumyana Ivanova
Faculty of Sport, Department "Football and tennis",
National Sport Academy "Vassil Levski",
Sofia, Bulgaria

Abstract

An author's model for developing specific jumping endurance in unity with improving technical-tactical training of badminton athletes is presented. Dynamic exercises involving a series of jumps over obstacles followed by combinations of shots into the court are applied. The "multishuttle" method was used to program the plays by the coach. The model covers two-stroke microcycles during the competition period. The load is adjusted by varying parameters such as the series of rebounds performed, the intensity of the shuttlecocks served by the trainer, change of rhythm, etc. Furthermore, conditions relating to modifications of the technical-tactical tasks to the athletes are set, such as execution, such as the execution of a particular type of shot with a specified goal, direction and amplitude. The workload modeled in this way creates conditions as close as possible to the competitive ones while achieving a high density and intensity of the training session, leading to optimal readiness for competition.

Keywords: *badminton, plyometric model training, jumping endurance*

INTRODUCTION

Badminton is a sport with a complex motor activity that has an interval-variable character, with aerobic-anaerobic (glycolytic) provision. Consequently, the motor actions have a speed-force character and are manifested with considerable variability for a long time in conditions of compensated fatigue. This determines the goal of sports training - building speed-strength, jumping endurance and effective regulation of movements on a broader aerobic basis.

According to Dasheva & Bonova (2020), the criteria for trainability in badminton are the high level of specific performance (speed-strength endurance with the interval-variable character) and the maximum effective biodynamic and kinematic structure of motor actions in the conditions of progressively increasing fatigue.

D. Dimov & Tzankova - Kaloyanova (2022) revealed the need to create training programs to achieve conditioning through sport-specific training tools. Individual aspects of motor development and the influence on changes in badminton players' techniques have been studied in the specialized literature. The most numerous publications are related to improving the physical training of badminton players and its specific indicators for improving attacking strokes, particularly *smash* and *jump smash*.

Achieving high levels of lower extremity explosive power and sustaining them in the face of progressively increasing fatigue is basically a special endurance jump. The problem has been the subject of research by a wide range of authors: Abdurrahman et al. (2016), Kubo et al. (2007), Kannas et al.(2012), Asif et al. (2018). Other authors revealed a positive relationship between plyometric training and improvement in agility and flexibility (Saqipi & Iseni, 2020).

In the publication "Specialized test for the study of jump endurance in badminton players", Yordanov (2013) points out specific parameters for evaluating lower limb explosive power in athletes, noting the need for control and its importance for improving the quality and refinement of technique in the smash shot.

We are interested in Fröhlich et al. (2014) publication, "Training effects of plyometric training on jump parameters in d - and d/c-squad badminton players". The authors highlight two main emphases in their methodology with plyometric means: *the need to reach a maximum height at the rebound and finding the optimal racket-shuttlecock contact point at the moment of hitting*. The conducted eight-week program with plyometric means proves its positive effects and high weight factor for forehand/overhead smash stroke improvement. In addition, the positive result of improved starting reaction at the foot contact with the floor, which is particularly important for the specific badminton movement technique, was derived. Emphasis has also been placed on improving the anti-nociceptive skills of badminton athletes (Duncan et al., 2016).

The authors also reveal the place of plyometric training in the annual training cycle - during the preparatory and competition

periods. The role and planning of dynamic exercises as an impact microcycle and an essential element of the competition period are emphasized; conducting them no later than two weeks before the main competitions to achieve maximum effects and improve competitive performance. Other authors discuss issues related to adherence to the principles of an individual approach, optimal volume, intensity and biomechanical expediency of the performance technique, which are the basis for planning this type of training, attention to minimizing the risk of injuries after a good warm-up and recommended coordination exercises, preceding plyometrics ones.

The commercialization of badminton, expressed in the growing number of tournaments with significant prize funds and the increasing competition between the players, poses more and more challenges to coaches (sports educators) in the search for the most effective, flexible training models. The periodization of the annual training program is undergoing significant changes in terms of shortening the individual stages of preparation. The focus is on modification and multi-field periodization, meeting the modern requirements for elite athletes.

For example, the typical duration of 3-4 months in the preparatory period is unrealistic in practice, given the saturated sports calendar and obligatory participation in tournaments to maintain positions in the world rankings. Therefore, the coach faces the problem of specific management of the training and competition process, which aims to support optimal form during most of the annual competition cycle while simultaneously realizing achievements in the main competitions of the year. As a rule, the emphasis during the competition period is aimed at maximizing the development and maintaining a high level of special fitness training in unity with sports technique and tactics and reaching the highest level of the body's functional capabilities during competition. Therefore, at the forefront is revealed the necessity of the search for effective models of training loads that bring the athlete's organism to a state of optimal readiness in the shortest time.

METHODOLOGY OF THE STUDY

The subject of the study was the influence of a plyometric loading model applied in the form of two shock microcycles during the competitive period of badminton players.

The object of the study is six national athletes (two (2) men, two (2) juniors and two (2) girls) who are preparing for high performance and participation in high-ranking competitions / from the BBF and BWF sports calendars in the 2023 competition year.

The aim of the experimental work is to apply a model for the management of specific training of badminton players, containing "shock" microcycles in competitive mesocycles, leading to the achievement of an optimal level of sports fitness for a particular high-rank series of competitions.

The task of the conducted study is related to creating and testing an author's model integrating loading with plyometric orientation and improving the technical-tactical preparedness of badminton players.

At a later stage, it is planned to track the impact of the applied model by observing game activity in competitions and preparing an expert evaluation.

In the scope of the overall study, diagnostic methods are used: modeling, observation, and expert evaluation. To take into account the effect of the applied model and to objectively evaluate the results, matches in the discipline "Single" of high-rank competitions are observed, and expert evaluation is made on the indicators (types of shots): attacking pull, shortening, smash, smash with the rebound, half smash, extraction, meeting service (type).

The variables are quantitative values in the unit "percentage" for each shot.

RESULTS AND DISCUSSION

Analysis of the work pattern implemented in the competition period

The overall training and competition load parameters during the two shock microcycles are presented in Table 1. Within two microcycles, 19 training sessions with different focuses were conducted with the athletes. Badminton players trained twice a day, five days a week. In addition, the program included working with a conditioning coach every training day. (Table 1.).

Table 1.Parameters for training and competition loading

General parameters of the training and competition loading	
1. Number of training weeks	2
2. Number of training days	10
3. Number of trainings	19
4. Number of training hours	38
5. Number of competition days	0
6. Number of days off	4

The developed loading model covers two shock microcycles during the badminton players' competition period. The training sessions were held twice a week, ten days before the main competitions. The recovery time between plyometric training sessions is not less than 48 hours. The dosage is tailored to the training group's level and to the athletes' individual characteristics. Therefore, the volume and intensity may vary depending on the current condition of the athletes.

Loading was achieved by performing a series of hops over obstacles (5 in number) of varying heights in the playing field, followed by a hit and/or combinations to hit the shuttlecock. The effect of the loading was intensified depending on the timing of the shuttlecock launch by the trainer - ***in the flight phase, shortly before landing after the last obstacle***. This way, maximum force generation and launch response are achieved from a broad base. The load parameters can be changed, presented in Table 2.

Table 2. Parameters of the plyometric loading

Loading parameters	Microcycle 1	Microcycle 2
Number of workouts with plyometric focus	2	2
Number of jumps per workout	100	150
Number of series per workout	20	30
Number of shots or combinations	1-3	1-3
Rest and nature of the recovery between the different approaches/series	Between approaches – 5-10 sec., in motion Between series – after 10th set – 2 min., active	Between approaches – 5-10 sec., in motion Between series – after 10th set – 2 min., active

The coach's ability to adjust the *intensity* and change the *rhythm* of the plays is of great importance. This is achieved by:

- firing the shuttle before the last jump in the phase of passing over the obstacle;
- in time with the athlete's landing;
- changing the speed and amplitude of the shuttlecock;
- variation of the combinations (angle, shuttlecock play zone), which also develops the anticipative skills in the athletes.

Additionally, tasks related to the technical-tactical training are solved, such as:

- *setting target areas for the hit*, which leads to the improvement of the precision of hits;
- *conditions for the type of the shot* - attacking, to increase the offensive efficiency;
- *execution of variation of the shot* (jump smash, half smash, offensive draw, extraction) to improve the variation and security of the strikes
- *complication of the exercise using a "heavy racket"*, thus achieving unity of work for dynamic strength of lower and upper limbs and refinement of technique in partially set (variable) conditions.

Motivation to perform this type of training, which involves a significant expenditure of both physical and mental energy, is essential. Therefore, the highly variable nature of the exercises applied in the Model is as close as possible to the competitive characteristics of badminton. In this way, the complete adaptation to the upcoming competitions, variety and versatility in the training process, increased motivation to work on a positive emotional background, and reduced growing tension of the forthcoming starts are achieved.

CONCLUSIONS

In conclusion, we believe that the application of modeled loads with plyometric orientation, combined with the improvement of technical-tactical training during the competition period, would contribute to the following:

- ✓ adaptation to the specific conditions of competitions;
- ✓ reaching the maximum development of special training in the unity of sports technique, tactics and physical training;
- ✓ improving the acquired motor habits, increasing the range of their variability and expediency, corresponding to the conditions of the upcoming competitions;
- ✓ preservation (optimization) and application of all components of technical-tactical preparedness and application in specific competitions;
- ✓ realization to the highest degree of the body's functional capabilities during competition;
- ✓ preserving, performing and maintaining sporting fitness for longer, given the busy sporting calendar.

REFERENCES

Abdurrahman, M. R., Miller, R., McErlain-Naylor, S. A., Hiley, M. J., & King, M. A. (2016). *Consistency in the badminton jump smash*. Kuala Lumpur: World Badminton Federation, 1-12.

Asif, M., Zusthi, K., Munjal, J., & Dhingra, M. (2018). Relationship among height, explosive power and shoulder strength on smashing accuracy in male badminton. *European Journal of Physical Education and Sport Science, 4*(9), 92-96.

Дашева, Д., & Бонова, И. (2020). Тренируемост на двигателните способности в спорта. [Trainability of the motor abilities in sport. In Bulgarian]. Спорт и наука. 1 (2), 7-24. ISBN 1310-3393

Dimov, D., & Tzankova-Kaloyanova, M. (2022). Study of sport preparation of football players of the elite youth group u 15. *Research in Kinesiology, 50*(1), 54-59.

Duncan, M. J., Smith, M., Bryant, E., Eyre, E., Cook, K., Hankey, J., Tallis, J., Clarke, N., & Jones, M.V. (2016). Effects of increasing and decreasing physiological arousal on anticipation timing performance during competition and practice. *European Journal of Sport Science, 16*(1), 27-35.

Fröhlich, M., Felder, H., & Reuter, M. (2014). Training effects of plyometric training on jump parameters in D/DC-squad badminton players. *Journal of Sports Research, 1*(2), 22-33.

DOI:10.18488/journal.90/2014.1.2/90.2.22.33 Online ISSN 2410-6534 Print ISSN 2413-8436

Kannas, T.M., Kellis, E., & Amiridis, I.G. (2012). Incline plyometrics-induced improvement of jumping performance. *European Journal of Applied Physiology, 112*(6), 2353-2361.

Kubo, K., Morimoto, M., Komuro, T., Yata, H., Tsunoda, N., Kanehisa, H., & Fukunaga, T. (2007). Effects of plyometric and weight training on muscle-tendon complex and jump performance. *Medicine and Science in Sports and Exercise. 39*(10), 1801-1810.

Saqipi, V., & Iseni, A. (2020). Effect of the 12-week program for developing explosive strengthening in students‘ agility and flexibility performance. *Research in Kinesiology, 48*(1), 38-41.

Yordanov, P. (2013). Specialized test for the study of jump endurance in badminton players. [In Bulgarian: Specialized test for the study of jump endurance in badminton players]. *Sport and Science, 4*, 21-27. ISBN 1310-3393

Correspondence:
Rumyana Ivanova
NSA “Vassil Levski”, Faculty of Sport,
Department “Football and tennis”
Sofia, Bulgaria
E-mail: ivanovarumi1@gmail.com