

BASIC AND SPECIAL PHYSICAL PREPARATION OF TOP TABLE TENNIS PLAYERS

Prof. Zoran Djokic

coach of Yugoslav National Team. Faculty of Physical Education and Sport – University - Novi Sad - Yugoslavia

1 Introduction

Physical training is a training chiefly aimed at the operation of motor and functional abilities. The aim of physical training is to increase the capability of organism regarding its specific motor abilities.

When a player is continually faced with finding solutions to new problems in different situations, the ability to perform the best-coordinated actions with most efficiency and without oscillations during the whole match increases, and successful action leads to feeling of being successful.

In case of top players, the physical requests are great, and, in order to play successfully, they must make a maximum of a complex effort. They must give their best, both physically and psychologically. Today optimal psychophysical qualities are required from players, especially taking into consideration that today's top players are perfectly physically prepared (as well as technically and tactically) and it is very hard to strike back at them if the physical abilities are lower than optimal. The important characteristic related to table tennis is that physical practice has to be viewed as an integral part of the completely training system, from basic to special preparations, from transitional, through preparation to competition period. Therefore working on a physical preparation of top players does not offer many possibilities for experiments, because the results can be fatal for the player.

2 Methods

Analysis of physiological parameters were done during the play of professional table-tennis players – by analysis of movement activities of top table-tennis players (240 top players, during the period from 1996 – 2003), major characteristic of duration and intensity during the match, within the research work in the field of current issues. By analyzing the matches on the great competitions, for example, it is concluded that in the system of playing till 11 points won during one team match a player makes about 100-110 lateral (side) movements (hops - stressing the left-right direction), about 50 so-called deep movements (back and forth direction), about 90-100 forehand swings, and about 60-70 backhand swings.

The problem of physical preparations of the top table-tennis players is observed in many aspects.

3 ESTABLISHING OF THE INITIAL STATUS OF THE PLAYER

For the establishment of the initial condition of a player the tests for basic and specific motoric abilities were applied. For that purpose the most adequate were collection of 15 tests for the estimation of basic motoric abilities and 3 tests for

estimation of specific motoric abilities (related to the table tennis itself), one or two of these tests are performed in laboratory conditions (the estimation of functional abilities), while other tests are so-called field (the estimation of motor abilities). For the estimation of all relevant motoric abilities, which will be explained below, adequate standardized tests were made, namely, the basis of data exist and are formed in last 6 years, to which the results can be compared.

With the analysis of the got results we get the actual picture of the condition of the player, the basis for planning and programming the training process.

Periodization of the testing is mainly based on the importance of that period and the importance of the following of the training effects. Mainly as an initial testing, it is done at the beginning of the, at the end of the preparation period, during the competition period if it is possible (if there is a pause in the competition), and at the end of the competition season. The annual series of competitions and preparations should be accompanied by 5-6 testing in order to create a clear picture of the player.

4 BASIC MOTORIC ACTIVITIES

4.1 STRENGTH

Strength is important motoric ability in every sport. The most important in table tennis is so-called dynamic strength (explosive strength and the endurance – repetitive strength). It has been proved that optimal strength has a positive effect in developing technique and feeling for the ball.

EXPLOSIVE STRENGTH - Definition: “ability to manifest maximal strength in minimal time interval”. In modern table tennis, there is a prevalence of movements which are as short as possible. Therefore, if strength to attack the ball is kept, it is necessary to activate more strength-speed over a shorter distance. The best effects are achieved by working in series: 4-8 series for all bigger muscle groups (muscles of arms, shoulders, back, stomach and legs) and plyometric method (jumping)

ENDURANCE STRENGTH - Definition: “ability of performing single and repetitive some of the simple movements”.

STATIC STRENGTH - Definition: “ability of retaining one maximal isometric contraction of muscles”

The aim of strength training is to enable the table tennis player to overcome the resistance of his own weight and the racket.

From the past working experience we concluded that the best results in the increase of endurance strength (the fastest development) are achieved by the combination of the circular method and the station method (8-10 stations are optimal), while in the competition period the most adequate practice of strength in series. In table tennis the practice with players own weight and so-called “free” weights is more adequate than the practice on the machines in a gym.

The practice of strength is mostly every day activity (in the training system), practiced at the end of the training, except on the competition day.

Some principles for strength exercises:

1. These exercises must have the same direction and amplitude as movements in table tennis when playing
2. The emphasized part of the amplitude has to be at the same position as when playing
3. The degree of exertion should be larger than during the play
4. The duration of exertion has to be similar as when playing or a little larger
5. Exercises for strength have to be combined with exercises for flexibility

6. For improvement of strength we have to gradually increase loads and methods have to be changed since the same method loses its effect.

The combination of weight and aspects of strength is very important in the strength practice. So, in order to achieve a quality it is necessary to constantly change the weight (1-2-3 days increase of the weight, an decreasing of it before the competition) and the aspect of weight (e.g. at the beginning of the week circular method, working in series – development of the endurance strength, then working in series for development of the explosive strength). Constant repetition of weight, the monotonous exercising and the work without combination of these three aspects of manifestation of strength mentioned above lead to the over-trained station, fatigue and in qualitative development of muscles, and the risk of injuries is increased.

4.2 SPEED

Speed is certainly one of dominant abilities in modern concept of table tennis game. It can be connected to agility (this is the ability of rapid changing of movements. It is typical for all sport games. A weak basic speed can be partially compensated by a good agility, without which the modern game is impossible).

The aspects of manifestation of speed are often called the components of the speed ability. And some of them are:

- **The speed of the motoric reaction** as a reaction to external stimulation. Reaction of a table tennis player is based on information he receives - his previous stroke, competitor's action, the path of the ball, next planned stroke.
- **The speed of performing each singular movement**
- **The speed of performing repetitive movement.**

For the table tennis play, every one of the speed components has remarkable importance. Speed training is always done at the beginning if the training after intensified warm up and mandatory light stretching. It is extremely important that there is an adequate pause between two exercises (so that the organism could recover after the previous effort, and that the player could give his or her maximum in the next exercise) the character of this pause must be active; the number of repetitions in the series should be such as not to decrease the speed of performing in the last attempt in the series. The duration of the speed training should be 30-45 minutes.

The exercises of the development of the basic speed and agility are mainly movements from the different start positions in heavy conditions i.e. running across the given section with maximum speed.

Example of exercises:

1. Sprint 20 m from different starting position (sitting, lying)
2. Sideways table tennis movements 6 X 6 m
3. Left-right and forward-backward movements (maximal speed of performance at the same time technically correct)
4. Change of direction when given signal- forward, a side, backward (audio or visual)
5. Sprint from different starting line
 - 3 m and back - 6 m and back - 9 m and back - 3 m and back ; without break. (or the same exercise connected with squatting, leaping, push-ups)

Examples for special exercises at the table:

- a) imitational training (maximal speed in performing certain exercises without a ball)
- b) table tennis exercise with a sparring partner or interval training with many balls
 1. Backhand-backhand block, B changes hard to forehand, A tries to return (attention to correct technique)

2. b-b block, A jumps, spin to forehand, B blocks into deep forehand, A tries to return (technique is not important).

3. Forehand around the table (sufficient pauses) and the like

Since it demands great effort and concentration, the trainings of speed should not last too long, and usually when they are performed during the competition period (main speed) after them should follow normal continuation of the table tennis training.

4.3 ENDURANCE

Endurance can be seen through two aspect of its manifestation – aerobic and anaerobic.

Endurance (aerobic) – the organism opposes to the fatigue caused by activities of aerobic character, that is the long lasting exercises in medium intensity, without lactic acid. Frequency of pulse is in range of 130-150.

Under the influence of long lasting systematic exercises general endurance can be perfected more than any other motoric ability, even to 10% of the initial state.

For the perfection of the general aerobic endurance the method of even continual weight and occasionally the method of variable weight. In further work the intensity is increased, and the volume of work is decreased. It is important to mention that the endurance is perfected only when the weight is such to cause fatigue and by that forces the organism to adjust to effort.

During the preparation period as well as during the competition period once a week, training of aerobic endurance is practiced by a long running, while during the specific period it can be exercised through the elements of the game structure.

Endurance (anaerobic) – Interval endurance and ability to maintain speed over a distance. This is an ability of maintaining speedy movements with lot of break-point, pause, and point. It has been proved table tennis is a sport where endurance of an aerobic-anaerobic type is needed. Pulse varies through the match from 130-180 and more. The ability of the organism to recover fast after efforts is essential.

With the perfection of the anaerobic endurance the greatest importance should be given to finding out the most optimal relation between intensity and volume of the work. The important thing is to respect the principle that the shorter is the part of the work the intensity of it should be larger, and that the ability of the organism to perform the action without oxygen (anaerobic conditions) has an important role.

As the most accepted method for development of this aspect of endurance is an interval method. In the preparation period, exercise can be carried out through the intervals of running (the best results are achieved with 3 minutes slow running – 3 minutes of 70-80% of maximum – lasting 40-60 minutes). In specific conditions the structural elements of competition activity through table tennis exercises (of high intensity), imitational trainings and many ball trainings.

4.4 COORDINATION

Coordination – This is the most economical means of making movements and precision in realizing a task. Good co-ordination is required in fast learning of technique. In table tennis co-ordination is displayed by complicated footwork, movement of body and arms and rapid adjustment to new situations.

Together with coordination we can explain the following abilities:

Kinesthetic ability - this is an ability to control limb's position and motion and tension of muscular system. Without watching his racket, the player must go to the ball at a desired speed and desired angle. Without this ability, good contact with a ball

(stroke) is impossible. Differences in this ability are especially notable among young players.

Timing - this is the ability to make contact between racket and ball at a desired moment (the ball must not strike the racket, but the racket must stroke the ball).

Precision – “Precision is manifested by striking the aim, throwing or leading an object to it, although it is often defined as an ability to perform exact, temperate and controlled movements ”It is crucial in table tennis and is specifically connected with coordination.

For the development and perfection of the coordination a certain maturity as well as experience is much needed. The learning of basic movements should start before the puberty. The ages from 8 to 12 are the most convenient for learning the movements. If this ability is not mastered at that age, it will be mastered very hard later. However, by systematic and hard practice the success may be achieved even later.

The basic is made of general agility, and the “feeling for the ball”, quick reaction, good perception of the distance, and the feeling for balance are the parts of it. The various aspects of coordination, quick orientation in the game, ability for making quick decisions and the quick and adequate use of the technically tactical tasks are based on it. In the mastered movements the players should find the best solutions, to harmonize with them and to use them in the game.

In the preparation period, the basic coordination is perfected by various polygons training, sport games, or exercises with special tasks. In the competition period the elements of the structural competition activity through the exercises at the training: many-ball interval training, situational training, or in a game with as many sparing partners as possible.

4.5 FLEXIBILITY

Flexibility – very important for quality of training and play and as a protection from injuries. It is a fact that the optimal flexibility is needed for a good technique. ”flexibility can be defined as an ability of a person to perform a movement with a bigger amplitude as possible” (V.I. Zaciorski). The significance of the flexibility is increased by the fact that it positively influences on strength, speed, coordination and endurance.

The most critical age for the development of the flexibility is around the age of 14 (the period of the abrupt growth). In this age it is recommended that the exercises for flexibility are done after the exercises of strength and every table tennis training. The development of the flexibility can be divided into two phases:

- **the phase of specialized improvement of the mobility of the joints, and**
- **the phase of the maintain the mobility of the joints at the level achieved.**

In the modern table tennis training the method of STRETCHING is widely used, and today it has become the integral part of the training.

Stretching is a method for stretching out the muscles, and its aim is to improve the mobility. It is very good as an additional to the strength training and coordination training. To the great extent it prevents the muscle injury and muscle problems. According to the newest researches in the lapse of one unit of the training, the mobility is increased for 5-10%. The time required for this is about 15-20 minutes.

5 RECOVERY TIME

Recovery time between trainings – is one of the most important elements in programming of training activities, after the 8 years of practice work with top athletes from table tennis and sport games, these are results which can prove the need for the adequate planning and programming training. The stage of super compensation (decisive factor in progress) arrived in following time intervals for certain motoric abilities:

Recovery time after maximum loads

Speed (anaerobic)	48 hours	until super compensation
Anaerobic endurance	48 hours	until super compensation
Aerobic endurance	72 hours	until super compensation

Combining with the exercises of strength (change of the method, intensity, and aspects of strength) as well as continual variability of methods, intensity and duration of training, in the preparation period after 10days it is possible to increase the physical form for 30-35%, by using these principles and patterns of sport training:

Training schedule for one week:

DAY	TRAINING 1	TRAINING 2
MON	Strength (repetitive) - series	Endurance (aerobic)
TUE	Strength (repetitive)–circular method	Endurance (anaerobic)
WED	FREE	Speed
THU	Strength (explosive) – series	Endurance (anaerobic)
FRI	Strength (repetitive) – short series	Endurance (aerobic)
SAT	FREE	Speed
SUN	Strength (repetitive) – station method	Endurance (anaerobic)

6 Discussion

Concerning the age of the player, the younger categories should be dealt with caution, but with the seniors, the optimal intensity of training should be applied. Of course, the injured players should have a special treatment, but the work on the maintaining of physical abilities starts the very moment when the injury is gone, in order not to lose much time.

The work in the club means the continual process, with the regular observation, which means long lasting process of development of relevant motoric abilities. The work with the national selections in the transitional, preparation period and before big competitions must be very precise, well programmed, and above all highly individual. Mainly, the beginning of the work with the national selections starts with the qualitative recovery, slowly renewal of the activities and right choice of optimal methodology and weight.

7 Conclusion

Definitely, working on an improvement of physical readiness of a player is inseparable part of specific table tennis training. The more the competition structure of the player is known (and together with it the structure of moving activities) the greater is the opportunity for more qualitative work. Therefore, for the achievement of the top-class results, it is necessary to perfect the player for a longer period. Only with careful observation of his development and programming it is possible to achieve best results, in any other case the results will not be satisfying.