

2.3 TESTS FOR EVALUATING RESISTANCE

2.3.1 TEST FOR ASSESSMENT OF ANAEROBIC RESISTANCE

These tests are based on travel distances developed such that the effort must be sustained predominantly by anaerobic glycolytic metabolism. Thus, the evidence likely to evaluate this type of resistance are:

- Races Of 100, 200 or 300 m:

The subject evaluated must travel in the shortest time possible considering distances.

- Race or return Shuttle run:

The test consists of two phases. In the first, the subject must travel a distance of 30m in maximum velocity, recording the time spent in seconds (t_1) time. After a rest period of 3 minutes the subject must run 210m in the space of bounded 30m for the first phase of the test. It is performed 7 flights of 30 meters in a race back and forth without pause. It is also recorded in seconds, the time spent on this tour (t_2). Records obtained with the two resistance index is calculated as: $i = (t_2)^2 / ((t_1)^7)$.

- RAST (running-based anaerobic sprint test)

Developed at the University of Wolverhampton (UK). The RAST is almost similar to the known Wingate test, although it is presented as specific as for athletes where the race is the way to travel. The athlete is heavy and takes a 10-minute warmup. After 5 minutes of rest, must complete 6x35m at the maximum possible speed, with an interval of rest between repetitions 10 seconds. Time (up to 1/100 second) in each of the repetitions and the following formulas are used log:

Power = $W \times D^2 / T^3$; where W = weight (kg); D = distance; T = Time.

From 6 records the power is calculated in each iteration to determine the maximum (highest); high power load (the lowest value); average power (sum of the 6 values / 6) and index fatigue (maximum power - minimum power / total time in 6 replicates).

2.3.2 TEST FOR EVALUATION OF AEROBIC ENDURANCE

As in the previous case, the tests used for the evaluation of this kind of resistance are based on a predominant effort supported by metabolism, in this case aerobic. In this sense, the design of some testing is aimed at determining, noninvasively, both oxygen consumption (VO_2 max) and anaerobic threshold, two good indicators of aerobic endurance. With these assumptions, the evidence that can be proposed to evaluate this type of resistance are:

- Harvard - Step test:

It is being submaximal in step and constant load. Although it is intended for individuals 20 to 30 years can also apply to young people. It is up and down a step height of 40cm for boys and 33 for girls at a rate of 22.5 cycles per minute for 6 minutes.

VO_2 max be estimated by using the nomogram of Astrand, cardiac related frequency effort obtained at the end of body weight.

- Test for 5 minutes:

It is a test of character and maximum rectangular type, where the effort is to maintain roughly constant during its lifetime. This can be inconvenient when applied to young athletes, since, in many cases they are not able to control this. It consists in measuring the distance traveled during a test of 5 minutes. Maximum aerobic velocity (V_{max}) and VO₂max is calculated from the following formula:

$V_{max} = 12 \cdot d$; where "d" is the distance in km

$VO_{2max} (ml / kg / min) = 3.23 \cdot V_{max}$; $VO_{2max} (ml / kg / min) = 39 \cdot d$.

- Conconi Test

This indirect (noninvasive) method to determine the anaerobic threshold is based on the concept that HR increases linearly with respect to the intensity of the effort made, until a turning point from which the FC is established despite to continue to increase exercise intensity. The turning point, according to Conconi, corresponds to the anaerobic threshold. The test can be performed on a running track or treadmill. In any case, athletes, heart rate monitor fitted, must travel sections 200m at increasing speeds until exhaustion.

Normally, untrained subjects run the first 200m in 70s (10 km / hr) whereas trainees do in 60s (12km / h). Furthermore, these initial rates should be adjusted to the level of younger athletes. The speed at the rate of 2s increase every 200m. The total time of the test should be between 10 to 12 minutes total distance between 2400 and 3200m. It is important to mark a slow start and a very gradual increase. It is advisable to use an automated system (audio playback system) for controlling the moving speed.

Cooper test

the subject must travel the maximum distance possible during the 12 minutes it takes this test. To facilitate the registration of the distance, you should develop stress on a well-defined path, as it can be a running track.

Table 4 significates

muy malo= really bad	Género=gender	Distancias=Distance
malo=bad	M=male	
medio=averaged	F=female	
bueno=good		
muy bueno=really good		
excelente=excellent		

Course Navette:

Is a maximum of character tests. It is performed on a space-delimited paths 20m lines. The subject must traverse this space on an ongoing basis (running back and forth) matching the end of each section with the signal reproduced by the audio system will broadcast with increasing frequency every minute. So the moving speed of the evaluated subject and will progressively increase in stages or periods of 1 minute duration.

The test ends when the subject is not able to follow the speed imposed (will retire voluntarily or is more than 2 meters from the boundary lines when the signal is broadcast on more than two occasions)

The last period completed by the subject, a fact which, together with that for the period (V / S) speed is included recorded in different calculations to determine the VO₂max

For youth 8-19 years VO_{2max} (ml / kg / min) = $31,025 + (3.328 \times V) - (3.248 \times \text{Age}) + 0.1536 \times V \times \text{age}$

Also in adults, VO_{2max} can be calculated by:

VO_{2max} (ml / kg / min) = $20.6 + 3 \times$ (number of the last completed shield or period)

VO_{2max} (ml / kg / min) = $23,663 + 0.2934 \times$ (number of the last completed shield or period)

2.4 Tests for the evaluation of joint mobility

joint mobility indicates the range of motion (range of motion) of a given joint. According to Garcia Manso, Navarro and Ruiz (1996a), the aspects that define the articlur mvilidad are:

Ability to stretch the muscle fibers.
Ability to stretch tendons affecting that joint.
Ability to stretch ligamenntos surrounding the joint.
Ability to move that allows the creation of joint walls.
Tonicity of the antagonist muscles affecting movement of that joint.
Control of the stretch reflex

The most widespread evidence that can be applied to assess this quality in some joints are:

Rotate shoulders back:

The subject must grasp with both hands pronated a cane or pica (which must have a metric scale) with arms outstretched adopting an upright position. Laas hands should be placed as close to one another if they prevent the subject or pike pass the baton over the head manteniendo arms outstretched. The result of the test is calculated by establishing a coicente in the numerator of the distance between the hands and the denominator shoulder width (biocromial distance), both in centimeters (cm) is placed.

Trunk hyperextension

The subject is placed in supine on a hard, level surface. Should raise the trunk using as supports your feet and hands. on one hand the distance between the heels and wrists (d1) at that position is recorded and ppor other, that distance is recorded on a straight extension arms above the head (d2) position. Both distances are used to determine the results of the test, including the following formula $(d1 \times 100) / d2$

Cureton test:

a) forward trunk flexion. The subject sits on a table with legs extended and leans delante much as possible. the distance between the front and table surface is measured.
b) Extension of the trunk. The subject is lying on a table sbre prone position with feet together and tries to lift his head and chest. The distance between the front and suerficie the table is measured.

Test wells and Dillon

a) flexion of the trunk to delante. The subject is raised to a bank and let the arms and trunk relaxed forward and maintain that position with arms

perpendicular to the floor. The distance is measured in inches from the top of the bank until the fingertips; above the bank register is negative, below is positive.

b) "Sit and reach". The subject sits on the floor with the soles of the feet flat on a stop (a drawer 35cm long and 32 high, which has over a plate 55cm long 45 wide and stands 15cm long drawer, with graduation into the positive and negative drawer from 0 to the subject). On flexing the trunk, you should try to get as far as possible with the fingertips, keeping his arms outstretched. The distance achieved on the scale provided on the bank is measured.

Previous tests apportan not valid measures for joint mobility and have been much discussed and criticized by most of the scientific community. First, the movimimentos studied are combinations of movements through several joints, making it difficult to determine what is being measured.

Además, las características antropométricas del individuo pueden afectar a la medición, dificultando las comparaciones entre sujetos.

Para solucionar estos problemas, la actuación del evaluador debe regirse por unas directrices determinadas, entre las que se encuentran:

- Observar y definir los movimientos en las diferentes articulaciones implicadas en el gesto deportivo y detectar de forma individualizada la optimización de los mismos.
- Establecer un protocolo de medida (movilidad pasiva y/o activa) que discrimine la acción de las extremidades sobre la articulación concreta, así como elegir una técnica o instrumental de medición (goniómetros, técnicas de imagen) que aporte mayor validez y fiabilidades posibles.

Thus, in the case of table tennis, articularesque movements can be evaluated are:

- Shoulder joint: movements of flexion, extension, abduction, adduction, external rotation and internal rotation.
- Joint Doll: Movements of flexion, extension, abduction, adduction, pronation and supination.
- Trunk: Can utiizarse evidence that global character, as indicated above, considering the corresponding limitations.
- Hips: flexion, extension, adduction, adduction, external and internal rotation. In these movements may consider flaxión or extension of the knees.
- Knee Extensions: From hip flexion 90 ° value the ability to extend the legs.
- Ankles: movements of flexion, extension, pronation and supination.

3. Concluding remarks

In this chapter has assembled a conjunt of tests that can be carried easily by coaches of young table tennis players to apply later the results obtained his training process. Although the tests shown here may provide information on the fitness of the young player, do not forget to be lantearse other evaluation that is oriented toward qualities and / or coordination capacities. Furthermore, both the evaluaciión and coordinative would need to emphasize the specificity of the tests come up. In the literature have not found specific evidence in table tennis that also meet the criteria of validity, reliability and accuracy. Appears, therefore, a wide field of study in which the design of evaluative evidence-based action game itself allows a more precise valuation of the player.

Finally, you can not forget the importance of other factors such as the materials (shovels, gums and oegamentos), sports technique, and related psychological processes, which are also crucial in high performance sport

specialty. It is the responsibility of the coach to apply different evaluation methodologies to also control such factors.