

## Battery of Tests for Prediction and Evaluation of Tennis Players

Isnidarsi, Eliana. M.; Gonçalves, André.C  
Center of Education, Department of Physical Education,  
University of Ribeirão Preto UNAERP Ribeirão Preto, Brazil

*ABSTRACT: Evaluation and selection of talents is a subject frequently discussed at various sport sciences congresses. This research traces a profile of the physical qualities and basic technical abilities indispensable for a tennis player to progress to higher levels. Renowned protocols of physical evaluation already exist in the literature. Model assessments of strength, agility, speed, flexibility and tennis skills were selected from a bibliographical search of published field-tested projects. This project with its standardized methods of measurement, and data collection can be used to guide the physical trainer. He or she will have a practical data analysis tool to present and visualize results in graphs depicting the evolution of each physical quality and technique. The data can then be used for subsequent comparisons. With a comprehensive evaluation, it is possible to analyze and diagnose progress with more precision. In order to prescribe the intensity of the training program it is necessary to have this longitudinal evaluation of the athletes' progress. The focus of this work is the fusion of the existing methodologies with computer science technology. The principle of simplicity is essential in order to be able to reproduce the project model on any tennis court. This efficient and effective method can encourage development of new and existing grass roots tennis programs in schools worldwide using very little resources. Because this method is practical, schools, need no more than a court, a track and a backboard.*

### MATERIALS AND METHODS

This project investigated seven (N=7) male tennis players varying in age from 8 to 13 years. The initial evaluation is especially important to determine the athletic condition of the player. After analysis of the findings, the initial threshold and individual program of training can be established.

To detect changes in performance, emphasis is given to precise measurement and recording of testing results. To standardize the amount of recovery time between exercises, the complete battery of tests is given to no more than two people at a time.

A "Starter system" was developed as a component of this project, to measure and strive to improve the speed of visual reaction, essential to a tennis player's success. The evaluation protocol also includes the following tests, some of which were administered three times as a part of each evaluation:

- |  |  |
|--|--|
| (1) Vertical jumps (VJ).                 | (7) Test of Mille (VO <sup>2</sup> max). |
| (2) Muscular Abdominal Resistance (MAR). | (8) Flexibility of Wells (FLEX).         |
| (3) Reaction Speed (RS).                 | (9) Horizontal Jumps (HJ).               |
| (4) Agility (AG).                        | (10) Broer-Miller for Tennis (BMT).      |
| (5) Dynamic Balance (DB).                | (11) Dyer for Tennis (DT).               |
| (6) Precision in Service (PS).           |  |

The following materials were used to administer the battery of tests and to record and analyze the findings of each tennis player's evaluation:

- (1) Computer with Microsoft Excel spreadsheet.
- (2) Anthropometrics analyses were recorded using Physical Fitness for Windows.
- (3) Physical Nutri for Windows was used to measure gain and loss of fat mass.
- (4) PolarHeart rate Monitor-model Edge.
- (5) Chronographer Timex - model Ironman.
- (6) Wells Box for measuring flexibility.
- (7) Traffic cones.
- (8) Tape measure.
- (9) Clipboard with evaluation form.
- (10) Tennis balls.
- (11) Tennis court.
- (12) Track.
- (13) Backboard.

In the original research, the combination of training and evaluation every six months accomplished a longitudinal study upon which the progress of the players could be measured and established the basis for the subsequent training regime.

## TRAINING

The circuit time training model is used during the seventy minute sessions scheduled four times a week. Training focuses on tennis skills including jumps, turns, balance, technical shots, steps, explosion, agility, coordination and speed visual reaction. as well as strengthening of the extremities, and aerobic and anaerobic-alactic resistance.

The trainer continually monitors the plan, checking for overload and adjusting the thresholds accordingly. The athlete receives feedback as he is taught new tasks and adjusts to the progression of his physical abilities and organic adaptation.



Figure 1: The student jumping in evaluation of Vertical Jump (VP)



Figure 2: Evaluation of Vertical Jump (VJ)



Figure 3: The trainer using the "Start System" for evaluation in Agility test (AG)



Figure 4: Evaluation of Dynamic Balance adapted to court.



Figure 5: Evaluation of Flexibility (Flex)



Figure 6: Test of Mille to VO<sup>2</sup> max



Figure 7: Anthropometrics evaluation

## RESULTS

	(V) (Cm)	Ram (1 min)	(PS)* (20balls)	AG* (Kmh .)	DB* (9m)	RS* (Cm.)	FLEX* (Cm.)	DT (14 balls)	(H) (Cm.)	BMI* (30 Sec.)	Mille* (min .)
<b>Before</b>	1.44 ± 0.05	43.71 ± 1.56	3.89 ± 0.60	9.36 ± 0.28	0.87 ± 0.09	16.71 ± 0.02	0.45 ± 0.12	0.54 ± 0.04	0.38 ± 0.11	7.67 ± 5.48	12.9 ± 0.50
<b>After</b>	1.53 ± 0.07	43.71 ± 2.61	7.39 ± 1.50	7.64 ± 0.25	1.05 ± 0.11	11.07 ± 1.71	0.30 ± 0.10	0.55 ± 0.03	0.31 ± 0.04	9.26 ± 7.03	15.3 ± 0.51
<b>(%)</b>	5.58 ± 2.07	-0.04 ± 6.83	66.35 ± 22.24	-18.75 ± 0.70	25.4 ± 14.9 3	56.5 ± 30.7	-52.7 ± 19.3	2.89 ± 8.24	7.73 ± 22.5 7	24.5 ± 8.46	18.3 ± 1.96

\* indicate statistically significant differences for a P<0.05

Gonçalves (1997)

Table 1 Results of evaluations done at the beginning and end of ninety days of training.

## DISCUSSION

Currently Brazil has many tennis players, clubs and training centers. The Brazilian Confederation of Tennis reports that last year the number of championships grew by 30% .

The International Tennis Federation's training program for tennis coaches has had considerable success with more than 600 technical coaches trained and 24 courses given around Brazil in one year. Unfortunately, there has not been the same effort to develop physical trainers for tennis. Only supplying technical training to players with 30 to 60 minute sessions will not increase the number of players or improve their position in the ranking. Beginning tennis players particularly need and deserve a more comprehensive coaching team and program to develop their skills and maximize their potential.

The development of a complementary physical training program with a multidisciplinary team approach is going to be critical in the near future. The players will benefit by having more than one specialist, and this will make it possible to have a healthy generation of tennis players.

It is essential to have a comprehensive training program based on the accepted and efficient methods of evaluation included in this project while recognizing the need for low costs. This can be an important asset to the game of tennis, especially for the beginning player, and the coaching team.

## CONCLUSION

In the studied group, the evaluation scores of participants at the end of the first training period showed overall improvement. The bioenergetics testing including the Mille (M) and Agility (AG) declined. The findings of testing that measure specific tennis abilities including the Precision in service (PS), Speed Reaction (SR), Dynamic balance (DB) and Broer-Miller Test (BMT), verified a significant improvement in the subjects score results. The agility and Mille scores could be improved with more time. Ongoing research will be needed to continue to develop this concept further, assuring its maximum effectiveness, and to make it widely available.

## REFERENCES

- Lea & Fediger. (1986) *Guidelines for Graded Exercise Testing and Exercise prescription*, American College of Sports Medicine. 3<sup>o</sup> rd, Ed. Philadelphia.
- Astrand P. O. (1960) *Aerobic Work Capacity in Men and Women With special Reference to Age*, Acta Physiol. Scand. (Suppl.), 49:169.
- Borg G. (1982) *Physiological Bases of Perceived Exertion*. Med. Science Sports. Exerc. 14:377.
- Caldas P.R & Rocha.S.O. (1978) *Qualidades Físicas em Evidência Durante o Evento tênis*, Caderno técnico didático MEC.
- Carnaval P.E. (1995) *Medidas e Avaliação em Ciências Dos Esportes*, Editora Sprint, Rio de Janeiro.
- Caldeira S.; Matsudo V.; & Lorenzini.C.T. (1978) *Características do Tempo de Ação do Tenista de Alto Nível e sua Relação Com o Metabolismo Anaeróbio*. Revista Brasileira de Ciências do Esporte, setembro. volume 5.
- Groppe J.E., Loehr J.,Quinn, A. Melville, Y. eds.(1992) *Science of Coaching Tennis*. Human Kinetic Champaign.III.
- Kirmayr C. A. (1987) *Mexa-se é Fundamental*, Revista Match Point, volume II, n 5, ed Nesc, São Paulo.
- Martens R. (1987) *Coaches Guide to Sport Psychology* Human Kinetics Publication Champaign. III.
- Mathews D. K. (1986) *Medida e Avaliação em Educação Física*, RJ, Ed. Guanabara.
- Matsudo V. K. (1983) *Testes em Ciências do Esporte*, 2<sup>o</sup> edição, São Paulo.
- Naumko A. (1996) *Confrontação das Cargas de Treinamento e de Competição*. in "Encontro Internacional de Desportos Competitivos Rússia-Brasil", Curitiba, julho.
- Petrovina A. (1996) *Qualidades Físicas do Tenista Profissional*. in "Encontro Internacional de Desportos Competitivos Rússia-Brasil", Curitiba, julho.
- Runinger J. (1978). *Como Olhar Melhor a Bola*. Revista Tênis Esporte, volume II número 4, maio.
- Skorodoumova A (1996) *Heart Rate During the Match*, in "Encontro Internacional de Desportos Competitivos Rússia-Brasil", Curitiba, July.
- Ulianov B. (1996) *Alguns Parâmetros da Ação dos Tenistas em Diferentes Tipos de Quadras de*. in "Encontro Internacional de Desportos Competitivos Rússia-Brasil", Curitiba, julho.