SOME SPECIAL EFFICIENCY FACTORS IN GYMNASTICS

ISTVAN HAMZA, K. BRETZ

HUNGARIAN UNIVERSITY OF PHYSICAL EDUCATION, BUDAPEST, HUNGARY

INTRODUCTION

A gymnast's high-level performance consists of several factors. The neuro-muscular and cardio-respiratory systems are burdened to extreme. Proprio-receptors, visual functions and their reliable mobilization have an important role from the beginning of the exercise to its end. Static and dynamic preservation of body balance is an important factor of the gymnast's performance.

During the execution of several exercise elements an off balance occurs. In these cases the aim is to redress balance quickly, keeping the values of the exercise while the gymnast strives for realizing formal requirements as well.

The aim of the present study is the instrumental and objective examination of top gymnast's balance-keeping in special positions. We carried out comparative examinations with the cooperation of excellent artists.

Hypothesis

The "Romberg test" and "sharpened Romberg test" are suitable for a complex evaluation of gymnast's balance-keeping provided that vestibular. muscular and visual perception be present simultaneously in the test.

METHODOLOGY

In our examinations we used an "Adam-type" force platform, ADDON microcomputer and AT personal computer. The horizontal sensivity was 1 mm. Duration of the measurement was 1 minute.

The Romberg situation was applied in the known classical body position.

The sharpened Romberg test (one foot in front of the other) was done on a 15 cms wide plate put on the platform.

The subjects were the Hungarian national male team of gymnastics: 10 persons (Age 18-24). The control group consisted of outstanding Hungarian male and female acrobats: 5 persons (Age 16-20). (Pilot measurement was done with one person, with special regard to the quantitative parameters of balance-keeping in hand-stand.)

RESULTS

The correlations of the investigated parameters are summarized on table 1.

Table 2. shows the basic data of measurements. The test results are demonstrated with the radius of characteristing circles containing 68 % of sampled data (±1 sigma)

Symbols and notations:

ROM CL (20,40,60): Romberg test. eyes closed, 20,40,60 s.

SHAR ROM (20,40): sharpened Romberg test. 20,40s, PL.COMP: placing (from 1 to 5)

Table 1. Correlation coefficients /n=15/

Parameter 1	Parameter 2	Correlations
ROM_CL_20	ROM_CL_40	0.3563
ROM_CL_20	ROM_CL_60	0.7819
ROM_CL_20	SHAR_ROM_20	-0.0857
ROM_CL_20	SHAR_ROM_40	0.1394
ROM_CL_20	PL_COMP	-0.2357
ROM_CL_40	ROM_CL_60	-0.0292
ROM_CL_40	SHAR_ROM_20	-0.6417
ROM_CL_40	SHAR_ROM_40	-0.3772
ROM_CL_40	PL_COMP	-0.7559
ROM_CL_60	SHAR_ROM_20	0.4865
ROM_CL_60	SHAR_ROM_40	0.5589
ROM_CL_60	PL_COMP	0.2315
SHAR_ROM_20	SHAR_ROM_40	0.9144
SHAR_ROM_20	PL_COMP	0.4851
SHAR_ROM_40	PL_COMP	0.1109

Table 2. Evaluated results /n=5/

Parameter	Mean values (mm)	St. deviation (mm)
ROM_CL_20	4.6	1.3416
ROM_CL_40	4.8	0.8367
ROM_CL_60	4.8	2.0494
SHAR_ROM_20	15.6	3.9115
SHAR_ROM_40	13.6	4.2778
PL_COMP	3.0	1.5811

DISCUSSION

These results are valid only for special group of top gymnast's. We could use the data for individual diagnosis and set up individual statistics. According to measurement data, the traditional Romberg test doesn't show the special abilities and achievement factors of gymnast's. The sharpened Romberg test proved to be appropiate for studyiuO the abilities of balance keeping and balance restoring. In this respect the performance of gymnast's significantly surpasses the average performance of uou sportsmen. The effect of loading ou balance is of great importance, too. We did the sharpened Romberg test before and after loading.

Interesting data ɯeɪɐ gained from examined acrobats. From the point of view of balance tests, there is uo essential difference between top level acrobats and top level gymnast's.

We bəd to take into consideration that the national team əud the team of acrobats were small in number. The measurement data of handstand showed the presence of higher frequency sway components than in the case of sharpened Romberg test.

CONCLUSION

Balance keeping and restoring in dynamic circumstances (e.g. a competition) and the sharpened Romberg test which we used are different performances. But these results are in connection with each other. as in both cases the same main factors are present.

To find a connection between the two above mentioned performances a greater number of further measurements and their statistical processing will be needed.

REFERENCES

Boloban V.N., V.G. Siltshenko, E.V. Birsk (1990) Metodika stabilografii v isledovania ustoitshivosti tela sportsmena i sistemi tela pri vipolnenii gimnastitsheskih, akrobatitsheskih uprashnenii. KGIFK. Kiev. 1 - 23.

Carlo, D. (1990) Aggiomamento Lecnico sulla preparazione delle gimnaste in Cina Gymnica 4. 2-6.p. 25-26.p.

Hartig, R., Buchmann, G. (1988) Geratturnen - Trainingsmethodik Sportverlag Berlin 138-144.p.

Kobjakov, J.P. (1976) Trenirovka vestibulamovo analizatora gimnasta Moskva, Fizkultura i Sport, 3-60.p.

Ratov, I.P., Merkulov, V. (1976) A possibility of investigation using technical means for the function control of posture of stability of the body and its parts. Agressiologie. Paris, 12: spec. No."C". 75-76 p.