STABILOMETRY OF THE FLAMINGO BALANCE TEST

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INTRODUCTION

The Flamingo balance test achieves the requirements of simplicity, low cost and it is capable for mass investigations. In this test the subject is standing on his preferred foot, bends his free leg backwards and grips the back of the foot with hand on the same side, standing like a flamingo.

The aim of this work was to characterise the Flamingo test with using electronic stabilometry equipment, recording stabilograms, time functions in frontal and sagittal directions, as well as Fourier spectra, while solving this test.

SUBJECTS AND METHODS

Ten physical education major university students / aged 21-23 years / took part in the investigation. We used "Adam" stabilometer for the measurements and a "Bárány-type" rotating chair.

The measurements started with testing in Romberg position, with opened and closed eyes.

The test battery includes the following situations.

a. *Task No.1.: standing on the platform, looking ahead with arms straight out from the body, with opened eyes.*

b. *Task No.2.: as in "a" but with closed eyes.*

After these tests the subjects were rotated 10 times for the vestibular stimulation / n = 40 r.p.m. / and the investigations have been continued with Romberg and Flamingo tests.

c. *Task No.3.: as in "b".*

d. *Task No.4.: as in "a".*

e. *Task No.5.: Stabilometry in "Flamingo position".*

The displaying of the test results was based on the radius of the characterising circle which contains 68 % as well as 95 % of sampled data of the stabilograms. (Ri). We recorded the time - displacement diagrams and Fourier spectra. The measurement time for each test was 60 s..

RESULTS

Fig. 1. demonstrates the stabilogram of the Flamingo test with time functions and Fourier spectra, with quasi-losing of the balance.

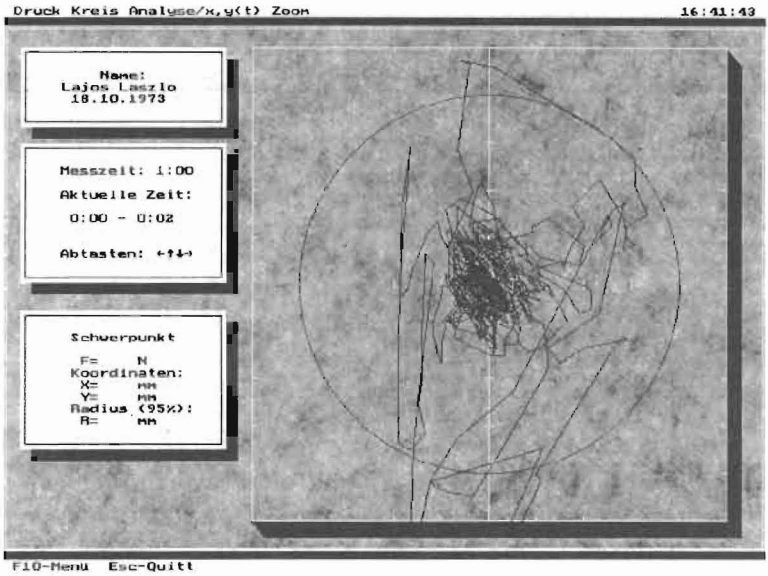

Fig. 1/a The stabilogram in „Flamingo" position /R = 24,5 mm/

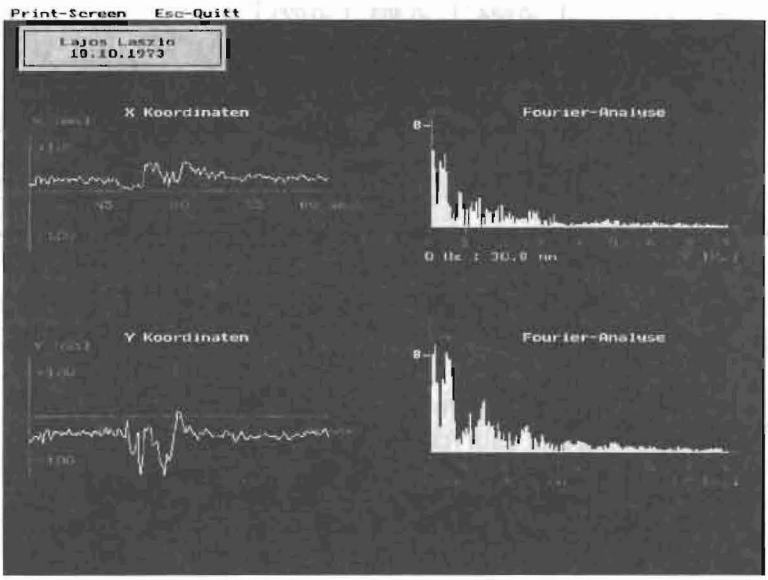

Fig. 1/b Time-displacement functions and Fourier spectra.

No	Name	Age	Mass	Height	RI B	RII B	RII D	RI D	FL B
		years	kg	cm	mm	mm	mm	mm	mm
1	B.E.	21,5	84	188	6	11	13	9	15
2	H.U.	21,5	74	176	6	9	13	7	15
3	P.A.	23,0	61	174	6	8	13	9	13
4	S.Z.	21,0	76	180	5	13	9	5	8
5	S.Z.	22,0	78	190	14	9	16	7	11
6	N.A.	22,0	67	171	5	8	15	6	10
7	B.E.	21,0	83	189	8	14	11	8	12
8	F.O.	23,5	71	180	7	7	9	4	10
9	L.A.	22,0	74	185	4	10	8	6	10
10	T.O.	22,5	71	176	4	12	13	4	8
		Age	Mass	Height	RI B	RII B	RII D	RI D	FL B
	Average	22,0	73,9	180,9	6,5	10,10	12,00	6,5	11,20
	St. dev.	0,82	6,97	6,76	2,92	2,33	2,67	1,84	2,53
	Skewness	0,57	-0,27	0,08	2,17	0,44	-0,18	0,00	0,39
	Kurtosis	-0,29	0,28	-1,51	5,50	-1,01	-1,06	-1,17	-0,91
	Ave. dev.	0,60	5,12	5,68	1,90	1,92	2,20	1,50	2,04
		Age	Mass	Height	RI B	RII B	RII D	RI D	FL B
	Age		-0,684	-0,383	-0,023	-0,730	0,000	-0,296	-0,161
	Mass			0,838	0,320	0,623	-0,102	0,204	0,228
	Height				0,567	0,417	-0,136	0,299	0,177
	RI B					-0,139	0,472	0,259	0,181
	RII B						-0,250	0,039	-0,192
	RII D		Correl.	coeff.				0,362	0,313
	RI D	-							0,811

Table 1. Results of measurements.

RI-B : Romberg test data /opened eyes/
RII-B: Romberg test data /closed eyes/
RI-D : Romberg test data /opened eyes/, after rotating,
RII-D: Romberg test data /closed eyes/, after rotating.
FL-B: Stabilometry data of the Flamingo test.

Excerpts of results, using the (68 %) characterising radius of stabilogram /averages/:
Romberg tests before rotating: RI-B = 6.5 mm /opened eyes/, RII-B = 10.1 mm /closed eyes/.
After rotating: R II-D= 12 mm /closed eyes/, RI-D= 6.5 mm /opened eyes/.
Flamingo test FL-B = 11.2 mm /24,5 mm for 95 %/

We found significant correlation between the Romberg test data /after rotating/ and the Flamingo test: r = 0.811.

CONCLUSION

The results suggest the improving effect of the vestibular training on the balance of physical education university students. Following the "Bárány-type" rotation stimulation, in quiet-standing position, the postural control mechanisms were characterised by an increase in the stochastic movements of centre of pressure in frontal and lateral directions. This phenomenon has been controlled using the time functions of sway displacements in x - y directions as well as with vector representation and Fourier spectra. At the investigated, well trained subjects, a complete vestibular restitution occurred with a short latency, following the rotation stimulation.

The stabilometry in Flamingo test position differentiates better the athletes with high level balance capabilities than the traditional Romberg test. The applicability of the Flamingo test, controlled by electronic stabilometry methods, suggests the continuation of this programme to carry out mass investigations.

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