Balance control in children and adolescent girls with Turner syndrome.

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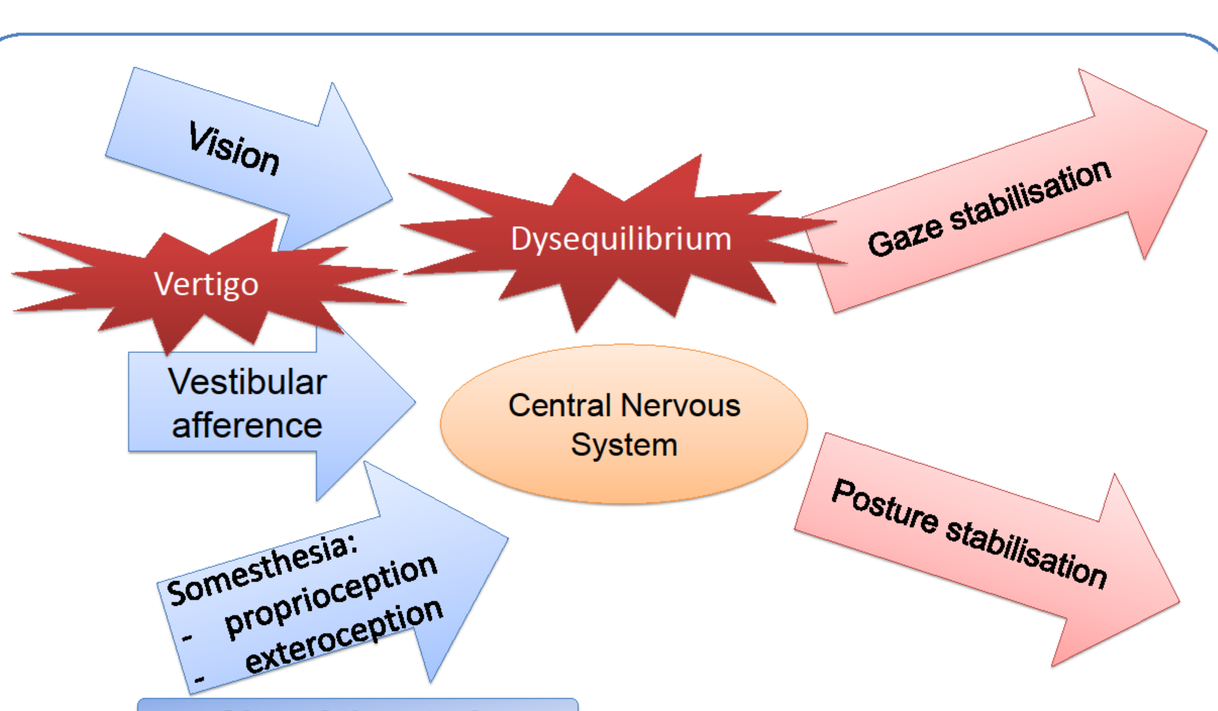
Introduction

Turner syndrome (TS), defined as the complete or partial absence of the second sex chromosome with or without cell-line mosaics, affects approximately 1/2500 live female births. The clinical features range from a severe phenotypic character (various malformations, including neuro-otological and visual deficiencies) to an isolated mild reduction of final height or premature ovarian failure. In several cases, hormone replacement therapy is indicated (estrogen or growth hormone).

Dizziness, falls, fractures and delayed learning of physical activities (walking, cycling, swimming) could be evocative of impaired balance control. Processing of sensory information from visual, vestibular and somatokinesthetic systems is required to organize an adequate motor response aiming at gaze and posture stabilization according to the expected task and to the environmental contexts, each element of the sensory-motor chain being possibly affected in TS.



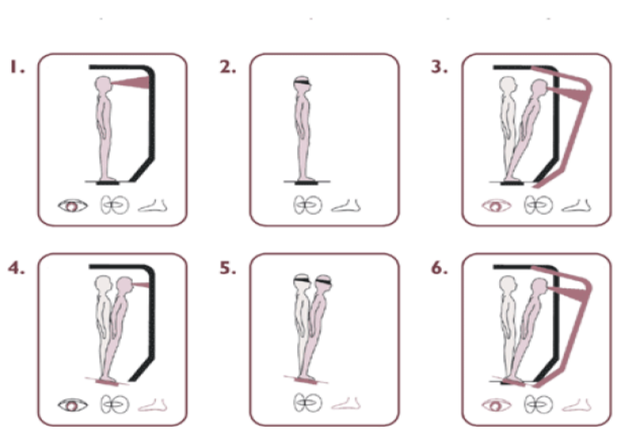
Aim of the study

This study aimed to analyze balance control specifities in TS children and adolescent girls.

Methods

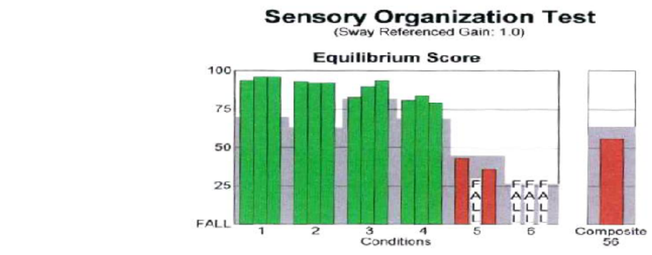
Twenty four female patients (mean age: 14.05 yr; 7,49 to 27,74 yr) underwent neuro-otological evaluation and dynamic posturography tests.

Sensory organization test	Inner ear	Vision	Somesthesia
Cond. 1 – Eyes open			
Cond. 2 – Eyes closed			
Cond. 3 – Perturbed vision			
Cond. 4 – Eyes open, perturbed somesthesia			
Cond. 5 – Eyes closed, perturbed somesthesia			
Cond. 6 – Perturbed vision and somesthesia			

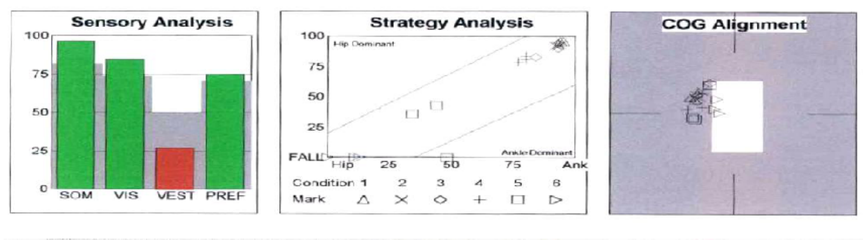


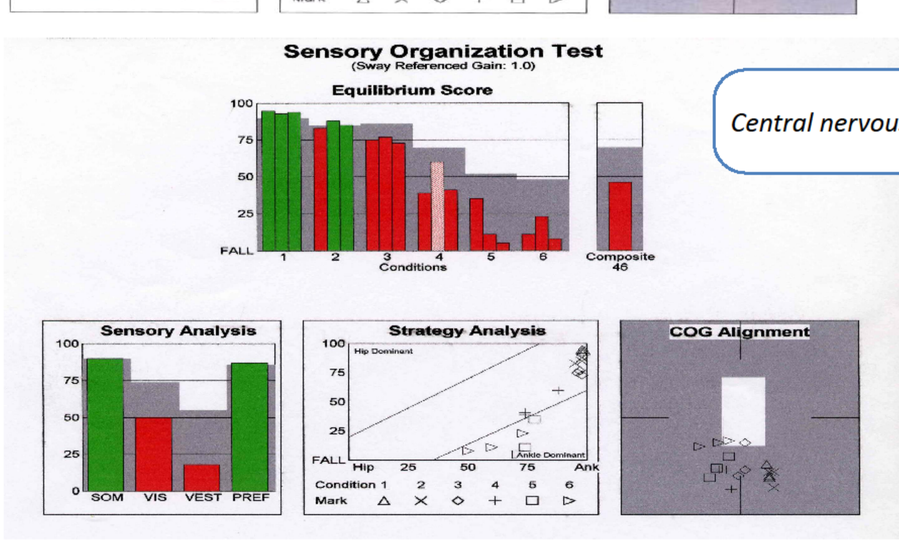
CES = (cond.1+cond.2+cond.3+cond.4+cond.5+cond.6)/6

Balance control - Slow rotational oscillations of the support:
Stability – Bottom up strategy (Type 1) / Instability – Top down (Type 2).



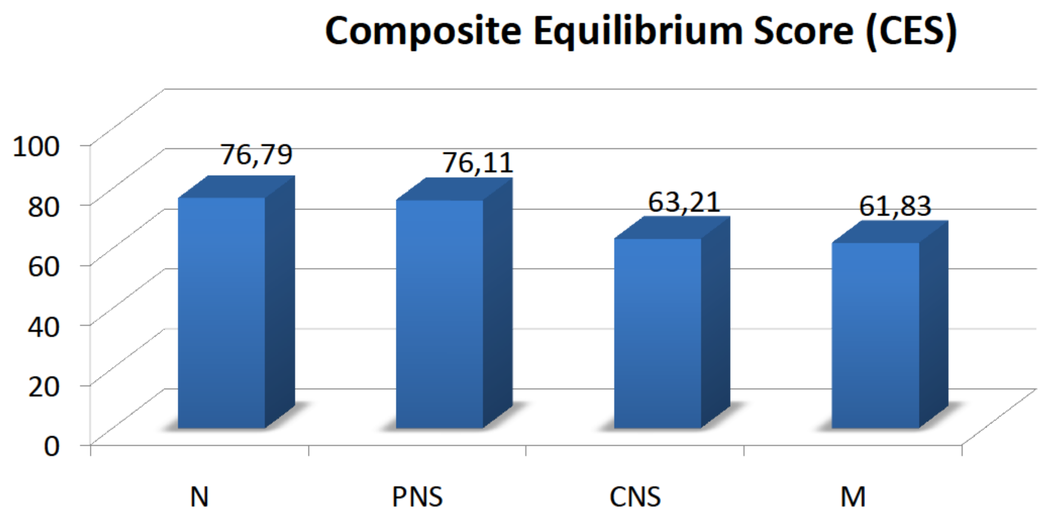
Peripheral (left side) balance disorders.





Central nervous system disorders.

Results



N: patients without vertigo or dizziness; PNS: peripheral nervous system disorders; CNS: central nervous system disorders; M: mixed (PNS and CNS) disorders.

Slow rotational oscillations	Type 1 % (n)	Type 2 % (n)	Fall
EO			
N	100 (7)	0 (0)	0 (0)
PNS	100 (7)	0 (0)	0 (0)
CNS	100 (6)	0 (0)	0 (0)
M	100 (4)	0 (0)	0 (0)
EC			
N	71.43 (5)	28.57 (2)	0 (0)
PNS	28.57 (2)	57.14 (4)	14.29 (1)
CNS	16.67 (1)	83.33 (5)	0 (0)
M	25 (1)	25 (1)	50 (2)

Bottom up (type 1) and top down (type 2) strategies in eyes open (EO) and eyes closed (EC) conditions.

Conclusion

Balance control is altered in Turner patients and this has to been taken in account for prevention of the adult fracture increased risk.

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Turner Syndrome

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