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Fall risk and laterality in the elderly

Marta Castaner[a]*, Gloria Sauch[a], Juan Andueza[a], Oleguer Camerino[a]

[a]*Laboratory of Human Motor Observation. http//lom.observesport.com/ INEFC, University of Lleida, Spain.*

Abstract

Elderly people often show impairment in several motor skills, such as balance and coordination, and their laterality may also be affected. This study sought to analyse the relationship between fall risk and laterality in an elderly population. Thirty-three elders who were participating in exercise programs were studied using two instruments: the Tinetti Mobility Test (TMT), as a clinical test that predicts fall risk in the elderly, and the Dynamic-LATMO, a tool for observing the use of laterality in motor skills execution. Results showed a significant association between the standing balance score on the TMT and the task of standing on one leg in the laterality test.

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Keywords: Computation; Observable behaviors; Sport observation

1. Introduction

The laterality of human body is a key factor in understanding motor skills. It is an essential feature of our bodily experience and depends on inherited, socio-cultural and functional factors along the evolutionary stages of the person. Laterality is not merely a question of handedness, foot preference or sensory dominance (visual vs. auditory, etc.), but an important factor that develops in conjunction with the way in which our body uses and orients itself in space. The performance of all kinds of motor skills also implies knowing the spatial variables that influence the development of motor behaviour.

* Marta Castaner. Tel.:+4-345-43-432.
E-mail address: castaner@inefc.udl.cat

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2. Methods

The sample comprised 90 elderly people who regularly attended supervised exercise programs. The tests were administered to each participant individually during the sessions that formed part of the exercise programmes. Referred to the motor skills that Dynamic-LATMO we adapted the stations five and six. Station five was applied from a normal chair instead from a gym bench and station six was applied only by touching an upper ball instead and without jumping. The method design is an embedded mixed method (Anguera et al., 2014).

2.1. Instruments

We used two instruments: the Tinetti Mobility Test (TMT), as a clinical balance and gait test that predicts fall risk in the elderly, and the Dynamic-LATMO (Castañer et al.,2012), a tool for observing the use of laterality in motor skills execution (Castañer et al., 2009) (table 1).

Table 1. The Dynamic_LATMO, showing the coding of the segments that perform the precision action: (H): Hand; (F): foot

	Description	**Motor skill**	**Aspect to be assessed**
1	Walking forwards towards an obstacle	Sequential locomotion	Foot that takes the first step (F)
2	Dodging the obstacle	Locomotion: propulsion	Side chosen to go round the obstacle (F)
3	Stepping up onto a gym bench	Stability: support	Foot used to step up onto the bench (F)
4	Standing on one leg on the gym bench	Stability: support	Foot that is lifted (F)
5	With one hand on the bench, swinging both legs	Stability: support	Hand used for support (H)
6	Controlled vertical jump to touch a hanging ball	Manipulation: impact	Hand that touches the ball (H)
7	Picking a ball up off the floor	Manipulation: directing	Hand used to pick up the ball (H)
8	Bouncing a large ball and throwing it	Manipulation: directing	Hand used to bounce the ball (H)
9	Catching a ball and then throwing it	Manipulation: directing	Hand used to throw the ball (H)
10	Placing and kicking a ball against a large obstacle	Manipulation: directing	Foot used for kicking (F)

3. Results

Pearson's Chi-squared test with Yates' continuity correction was applied for the eight first stations of LATMO, because we considered that throwing and kicking a ball was not the interest for value the balance of the body. Results showed only one significant association between the standing balance score on the TMT and the task of standing on one leg in the laterality test, regardless of whether this was the right or left leg (figure 1).

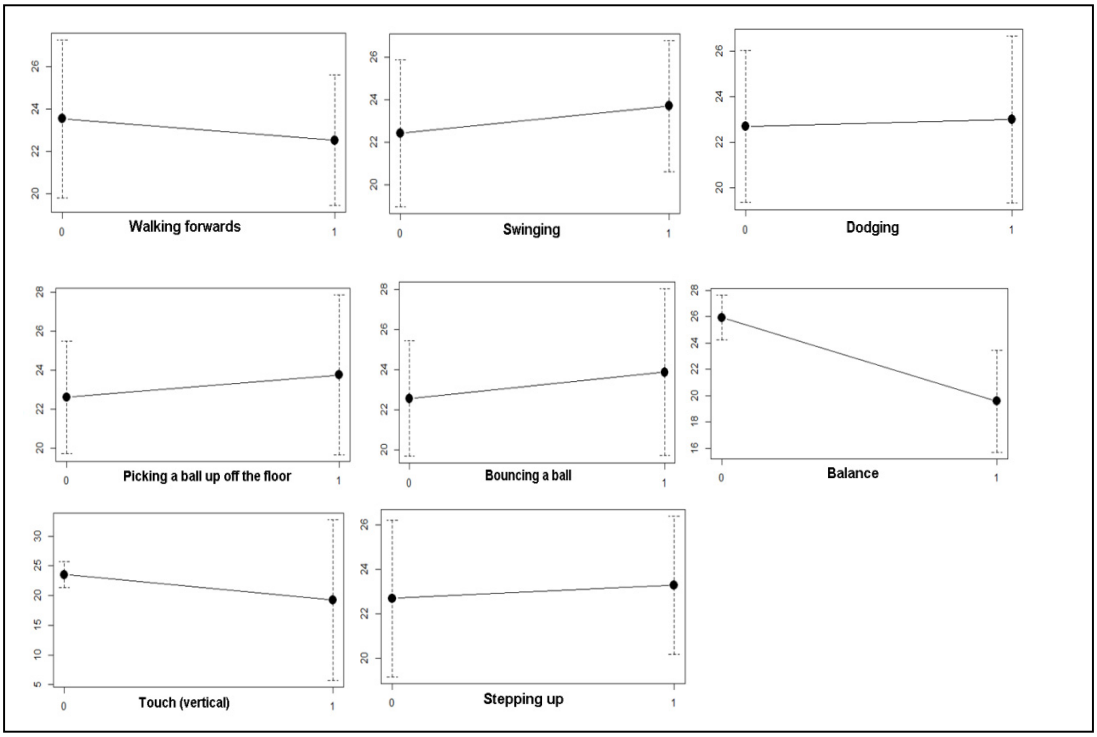

Figure 1. F test to compare two variances: fall of risk from TNT and eight motor skills of LATMO

4. Discussion

The balance section of TMT focuses on several types of balance: sitting balance; rises from chair; attemps to rise; inmediate standing balance; standing balance; nudget; eyes closed; turning 360 degrees; sitting down. Only standing balance showed a significant association with the action of balance from Dynamic.LATMO: standing on one leg on one gym bench. It shows to us that the lower limb laterality of the body influences on satnding balance and the limb laterality of the others motor actions of LATMO have no association in balance performance.

The precision of every movement has its basis in stability (Warren 2006). Indeed, if the body is not stable then motor behaviour becomes less precise. The performance of basic and specific motor skills, like body kinesics (Castañer et al., 2013), requires an optimum contra lateral combination between the postural support offered by the non-dominant body segment and the gestural precision of the dominant one (Castañer et al., 2012). If in the context of physical education and sport there is a need for an exhaustive analysis of motor laterality it is also important to be maintained in the elderly in order to prevent fall risks due to problems in the balance of the body. This should seek to address the following objectives:

- To identify correctly the way in which postural support and gestural precision are combined in the motor laterality of each individual.
- To maintain optimum lateralization when performing each motor skill.
- To achieve the maximum degree of motor efficacy in the dominant segments.
- To avoid favouring mimetic or stereotypical forms of laterality.

The programs of Physical Activity promote the physical exercise in the elderly (Saüch and Castañer, 2014). We think that the use of TNT scale combined with other tools as the Dynamic-LATMO, in the case of our study,

enriches the instrumentation for the evaluation of motor balance in the elderly.

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