

Fall Risk Assessment in Elderly with and without history of falls. Gait Electromyographic analysis. A comparative study

Coutinho, A.(1); Fragata, C.(2); Maio, D.(2); Vivas, I.(2);
Gonçalves, M.(2) (1) MSc Physical Therapy. Professor at Superior Health School Dr. Lopes Dias. Polytechnic Institute of Castelo Branco. Portugal. acoutinho@ipeb.pt gal
(2) Physical Therapist

Instituto Politécnico de Castelo Branco
Escola Superior de Saúde
Dr. Lopes Dias



INTRODUCTION

Problems : declining functional status, quality of life, independence and increased risk of accidents, among which is to highlight the increased risk of falls.

In Portugal, the falls are about 70 % of accidents in the elderly.

Public concern both in terms of morbidity and mortality, and in terms of costs to health and social services.

As such, it becomes extremely important to know the possible causes and risk factors of the occurrence of falls.

With aging occurs a reduction in fast contraction fibers compared to slow ones leading to changes in the rate of muscle activation which may have an important role in the process of falling occurs. The fall results, mainly the inability of the elderly to adapt their gait pattern to an unexpected situation in their daily routine, with about 50% of falls occurring during some form of locomotion.

OBJECTIVES

To find differences in electromyography parameters of rectus anterior, biceps femoris, gluteus medius, soleus, gastrocnemius medialis and tibialis anterior muscles between group with and without history of falls during gait in dominant lower limb and in which phases of gait they were more active and see if there was a relationship between the levels of muscle activation

and score in POMA (Performance-Oriented Mobility Assessment).

<http://www.scielo.br/peps>

SAMPLE

Non-probability, convenience, consisted of 30 elderly volunteers.

- WHF Group: 15 individuals with a history of falls;
- WOHF Group: 15 individuals with no history of falls.

INCLUSION CRITERIA

WHF group:

- Having ≥ 65 years;
- Having suffered 1 or more falls during the last year;
- Sign the informed consent.

WOHF group:

- Having ≥ 65 years;
- Have not suffered falls over the past year;
- Sign the informed consent.

EXCLUSION CRITERIA

- Products need to perform gait support;
- Possess a condition affecting the lower limbs and/or the gait.

MATERIALS AND METHODS

- BIOPAC *Systems*® to collect the data of electromyography following the SENIAM (*Surface Electromyography for the Non-Invasive Assessment of Muscles*) guidelines.
- Kinovea® for the collection of kinematic data that would lead to the identification of gait phases.
- POMA to assess the risk of falling.

RESULTS

% RMS related to MVC of	WOHF	WHF	<i>p</i>
Biceps Femoris	20,43±13,78	22,73±11,43	0,33
Rectus Anterior	19,79±14,17	21,47±13,76	0,494
Soleus	43,12±11,26	46,76±14,49	0,548
Gastrocnemius Medialis	40,72±13,51	43,92±11,97	0,443
Gluteus Medius	30,65±13,23	37,13±17,10	0,395
Tibialis Anterior	38,02±12,74	38,10±14,92	0,983
POMA score	26,87±1,60	24,47±1,60	0,001

Muscles	Support phase	Swing phase	Double support phase	Right single support phase	Double support phase	Left single support phase
Rectus Anterior	30(100%)		2 (6,7%)	14(46,7%)	14 (46,7%)	
Biceps Femoris	26(86,7%)	4(13,3%)	2 (6,7%)	4 (13,4%)	20(66,7%)	4(13,3%)
Soleus	21(70%)	9(30%)	3(10%)		18 (60%)	9(30%)
Gastrocnemius M	26(86,7%)	4(13,3%)	10(33,3%)	2 (6,7%)	14 (46,7%)	4 (13,3%)
Gluteus Medius	25(83,3%)	5(16,7%)	1 (3,3%)	4 (13,3%)	20(66,7%)	5 (16,7%)
Tibialis Anterior	27(90%)	3(10%)	7 (23,3%)	16(53,3%)	4 (13,3%)	3 (10%)

CONCLUSION

- Great variability of the results.
- WHF Group presents % activation relative to CVM > WOHF group (wo. s. s.)
- WHF scores in Group presents POMA < WOHF group (w. s. s.)
- Correlations between POMA and % muscle activation on the CVM (wo. s. s.)
- POMA is more effective and sensitive in assessing the Risk of Falling than EMG

Correlation between POMA and % RMS related to MVC of	<i>r</i>	<i>p</i>
Rectus Anterior	-0,013	0,946
Biceps Femoris	-0,169	0,372
Soleus	-0,109	0,566
Gastrocnemius Medialis	-0,084	0,657
Gluteus Medius	0,027	0,886
Tibialis Anterior	0,32	0,868

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