

# Fall Risk Assessment in Elderly with and without history of falls. Kinematic Gait 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@ipcbr.pt](mailto:acoutinho@ipcbr.pt) gal  
 (2) Physical Therapist

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

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## 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, so they can be created and implemented effective strategies for prevention and recovery in physical therapy.

A very common mechanism of falls is tripping, the cause of 53 % of falls in the elderly.

The specific point of the gait cycle that causes most frequently stumble is the mid-swing phase because this is the stage where there is less distance between the foot and the ground - MFC (Minimum foot clearance). The MFC is therefore a variable gait which is defined as the vertical distance between the lowest point of the foot, the leg that is in the swing phase, and the floor.

## OBJECTIVES

- Change in value of MFC among seniors with and without a history of falls;
- What is the Lower Limb joint responsible for this variation;
- Relationship between the risk of falling, obtained through the TUG (Timed Up and Go test) and the value of MFC.

## 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  $\geq 65$  years;
- Having suffered 1 or more falls during the last year;
- Sign the informed consent.

WOHF group:

- Having  $\geq 65$  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

KINOVEA

- One camcorder and focus light, placed perpendicular to the route to be made;
- Subjects in shorts and bare;
- Reflective spherical markers in dominant LL;
- Considered one gait cycle of each individual, from a pre-determined site.

TUG

- The subject stands up from a chair, walks 3 meters, turns, walks up to the chair and sits down again.
- No physical assistance was provided to the subject;
- The evaluator used a stopwatch to record the activity

## RESULTS

Correlations between joint amplitudes and TUG with MFC

		MFC (cm)	p
WOHF n=15	Hip range (°)	-0,171	0,542
	Knee range (°)	-0,135	0,631
	Ankle range (°)	-0,21	0,453
WHF n=15	Hip range (°)	0,22	0,431
	Knee range (°)	0,51	0,052
	Ankle range (°)	-0,143	0,611
All n=30	TUG (s)	-0,269	0,15

### CORRELATION TUG /MFC

- No significant differences ( $p = 0,150$ );
- But, negative correlation ( $r = -0,269$ ).

Comparison between the MFC and TUG WHF

	WOHF n=15	WHQ n=15	p
MFC (cm)	2,11±0,4	1,93±0,41	0,145
TUG (s)	8,48±1,11	9,58±1,55	0,056

Comparison of MFC between groups

	MFC	p
WHF	1,93±0,41	0,145
WOHF	2,11±0,4	

Joints with more influence on variation of MFC:

- WOHF: Ankle(21%) → Hip (17,1%) → Knee (13,5%);
- WHF: Knee (51%) → Hip(22%) → Ankle (14,3%).

## CONCLUSION

In our sample no significant differences in the value of MFC were obtained between the WHF group and the WOHF.

Even without significant value for MFC differences was determined that the LL joint responsible for its variation ( $p > 0,05$ ):

- WOHF: ankle;
- WHF: knee.

The correlation between the risk of falling, obtained by the TUG and the variation of the MFC was also not significant.

The use of the TUG is more sensitive and effective in predicting the risk of falling when compared to the kinematic analysis to obtain the value of the MFC and range of motion.

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