

Intervention study on program development of the exercise adherence for the elderly of Musculoskeletal Ambulation Disability Symptom Complex

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INTRODUCTION

Musculoskeletal Ambulation Disability Symptom Complex (MADS)

➤ **Definition**

State that risk of falling is raised by reduction of balance ability and walking ability with aging and staying at home

➤ **Diagnosis**

Those who have disease lowering motor function or history of such disease, and also daily living independence rank J or A, or whose motor function is one-leg standing with eyes open less than 15 sec. or Time up-and go 11 sec. or more.



OBJECTIVES

This study evaluates the effectiveness of this intervention program of home exercise adherence for fall prevention.

- 1. To compare Activities of Daily Living (ADL) and Physical Measured Value between pre and post intervention in both groups.**
- 2. To evaluate feedback effect of change in gait by motion analyzer.**



METHODS

■ Subject of Research

54 subjects recruited from female patients over 65 years of age with MADS under treatment at an orthopedic clinic.

27 subjects who had continued exercise more than 5 days a week were analyzed.

- **17 subjects from intervention group**
- **10 subjects from control group**

■ Period of intervention

from August 2012 until January 2013



Dimension of training

Item (number)	Goal	Content of training Level 1	Count / Day	Number of the level of difficulty		
				Lv.1	Lv.2	Lv.3
Balance exercise (1)	Improves standing balance by muscle strengthening around pelvis	One-leg standing with eyes open while holding on to a stable thing for 1 minute.	3	1	0	0
Ankle exercise (4)	Keeps tenderness by increasing range of motion in ankle joints	Sitting on a chair. Slowly raise toes with heels on the floor and stay for 5 sec. and then slowly lower them. Next, slowly raise heels and stay for 5 sec. and slowly lower them.	10	1	1	2
Toe grip exercise (10)	Stabilizes posture when standing and walking by increasing toe grip force	Sitting on a chair. Slowly stretch and bend toes with heels up and stay for 5 sec.	10	1	6	3
Muscles of the back exercise (7)	Prevents hunchback progress	Lift arms and stretch out as high as possible with legs shoulder- width apart.	5~10	3	2	2



Balance exercise



With eyes open

Hold on to a chair, etc



Put your feet up from the floor about 5cm

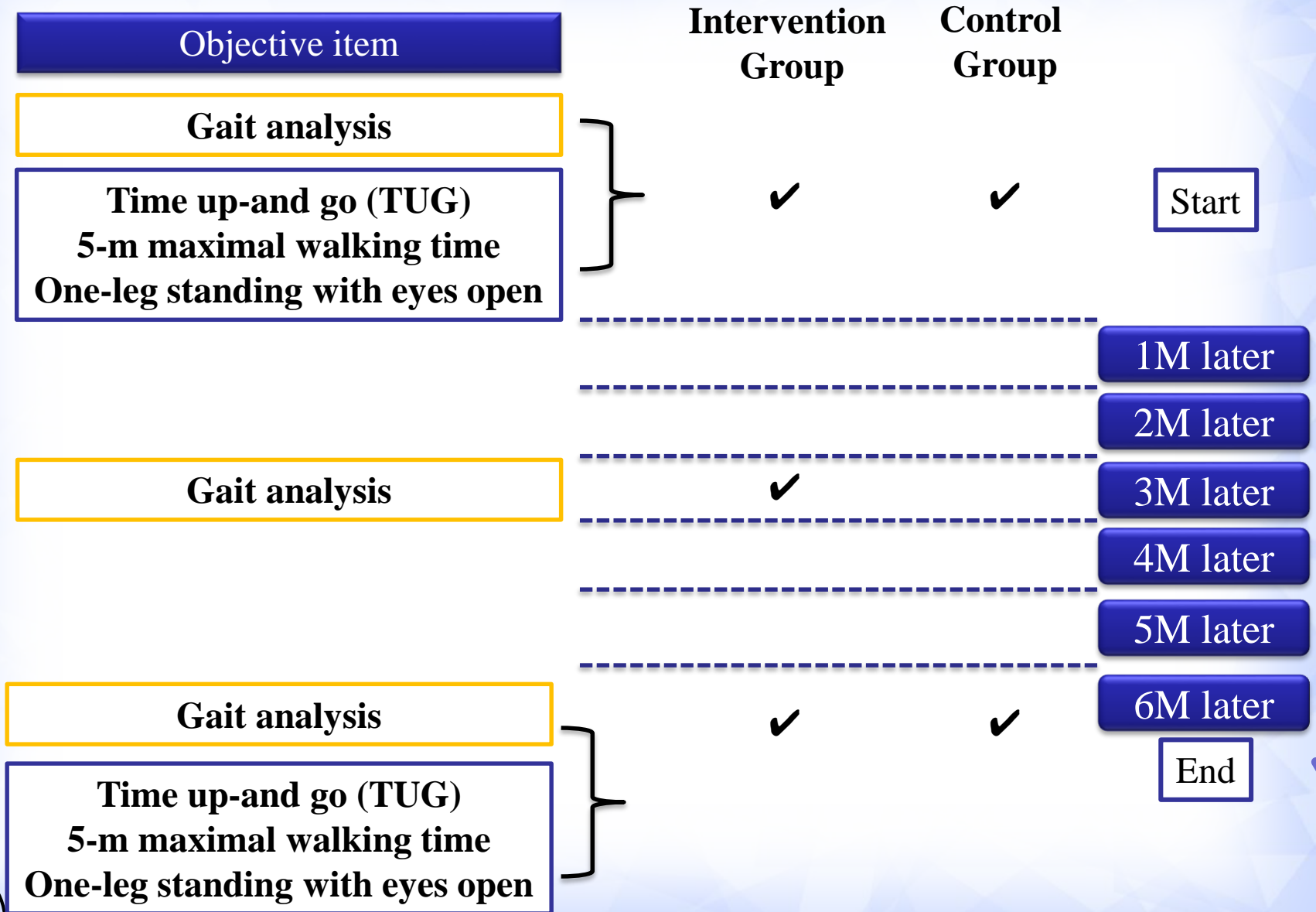
Ankle exercise



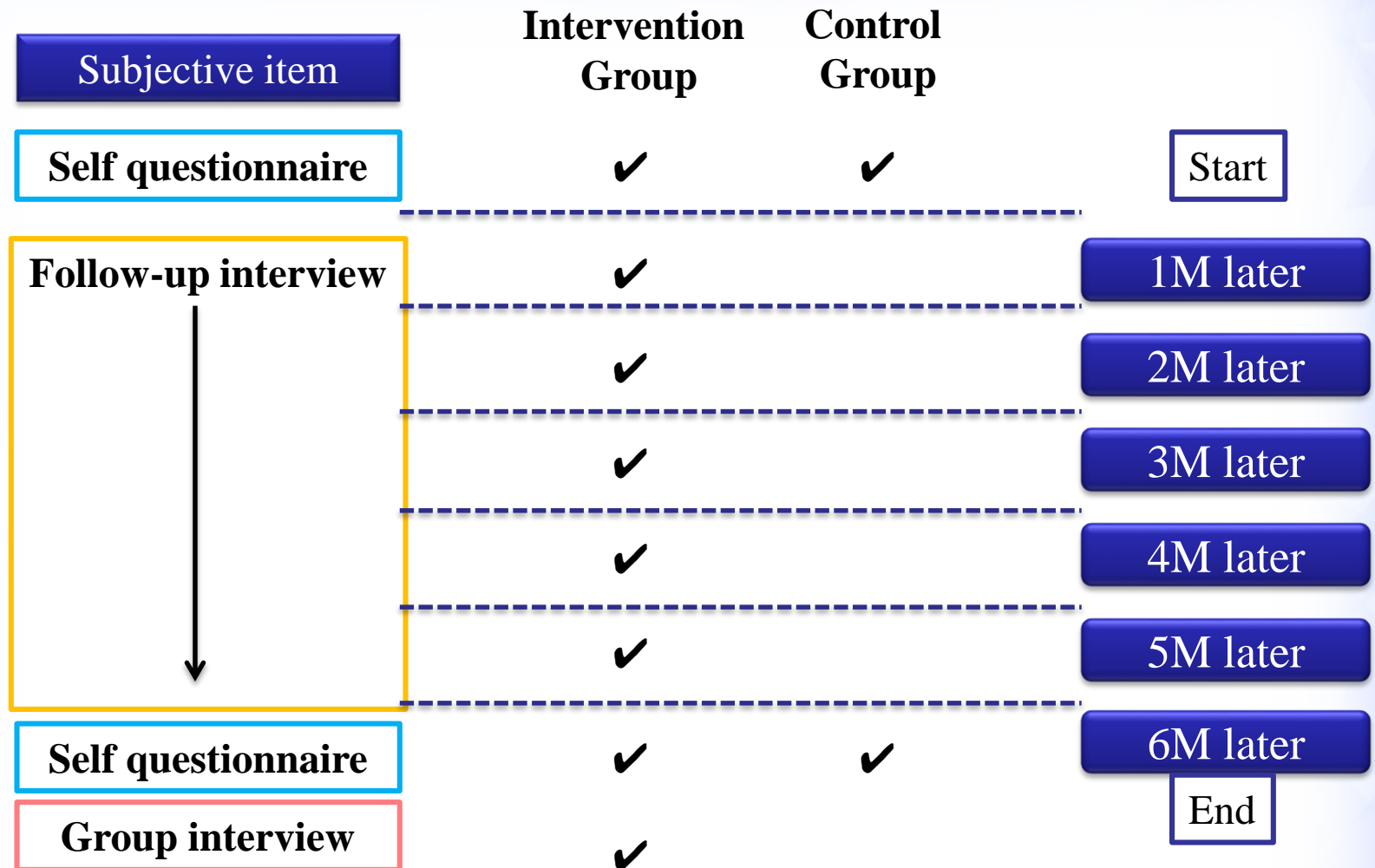
Toe grip exercise



Content of Intervention



Content of Intervention



■ Statistical procedure

- 1, Independent t-tests and paired t-tests were used to examine between and within group ($p < .05$) using the Statistical Package for the Social Sciences (SPSS Ver.20) for Windows.**
- 2, Content analysis was made on the training effects using the verbatim record of the group interview of the intervention group at the end of intervention.**



■ Ethical considerations

The subjects were informed verbally and in writing about the purpose of this study and that their anonymity would be guaranteed. The collected data were analyzed as set data. We ensured the safety of the participants, the protection of privacy, measures to reduce the physical and psychological burden caused by participating in this study, and appropriate measures to handle the withdrawal of the participants from the study. The data's confidentiality was preserved by shredding after the study period. The study received approval from Research Ethics Committee of school of medicine, University of Mie, Mie, Japan.



■ Gait analysis

3-dimensional motion analysis system (Library co., Ltd)

To analyze 5m stationary walking of 9m walking three times

6 fixing points of marker

- (1) Ear**
- (2) Acromion**
- (3) Great trochanter**
- (4) Head of the fibula**
- (5) External malleolus**
- (6) Head of the fifth metatarsal**

Content of analysis

- (1) Gait cycle**
- (2) Toe-up**
- (3) Heel-up**
- (4) Range of motion
in the ankle joint**
- (5) Range of motion
in the knee joint**
- (6) Head and Neck posture**
- (7) Trunk posture**



System configuration of Gait analysis (Library co., Ltd)



5m stationary walking

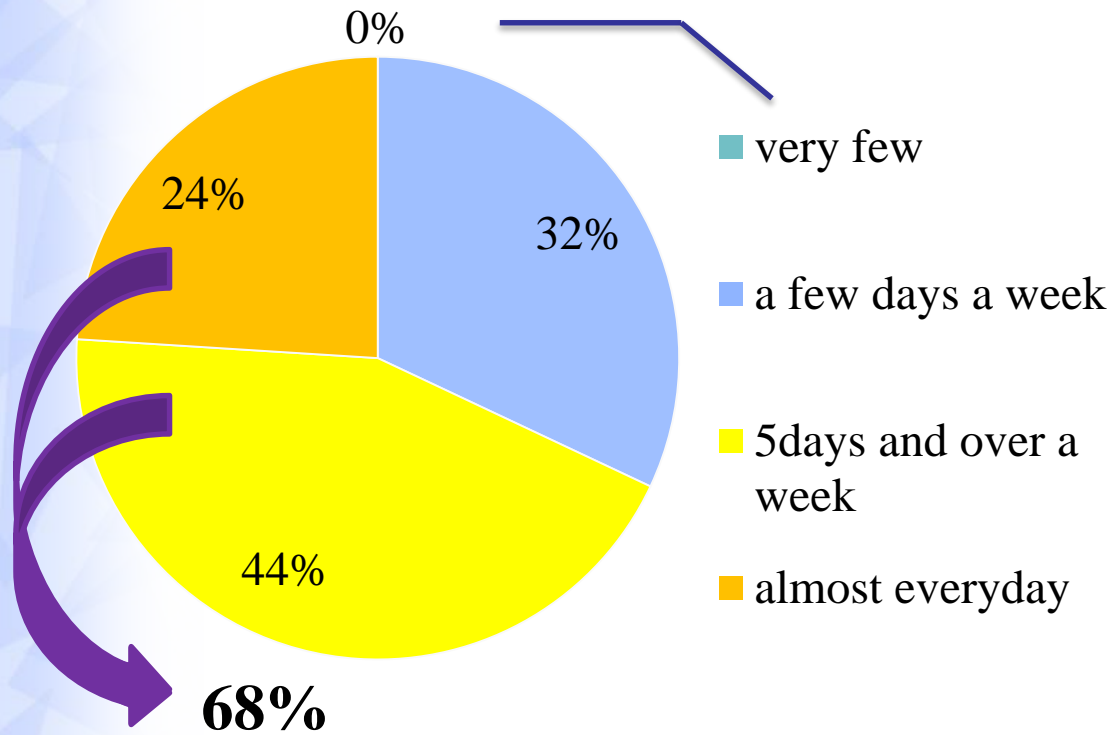
9m walking 3times

RESULTS

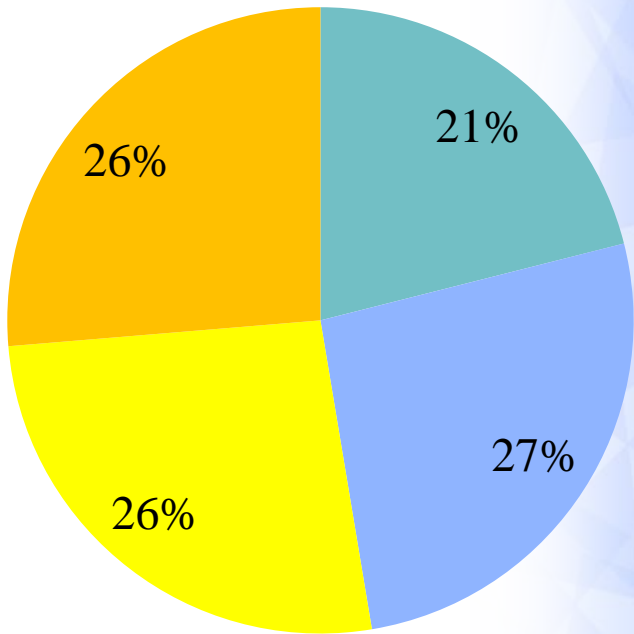
Measurement item	MEAN±SD	
	Intervention Group n=17	Control Group n=10
Age (y.o)	78.6±6.9	78.3±4.0
Height (cm)	147.2±4.7	149.2±5.9
Weight (kg)	55.1±14.3	52.3±9.0
Handgrip strength (kg)	19.6±3.4	18.8±4.8
One leg standing with eyes open (s)	9.9±12.7	12.4±13.2
Time up & Go (TUG) (s)	12.1±9.5	9.5±0.9
5-m maximal walking time (s)	5.2±1.8	3.9±0.8

Percentage of frequency of exercise

Intervention group



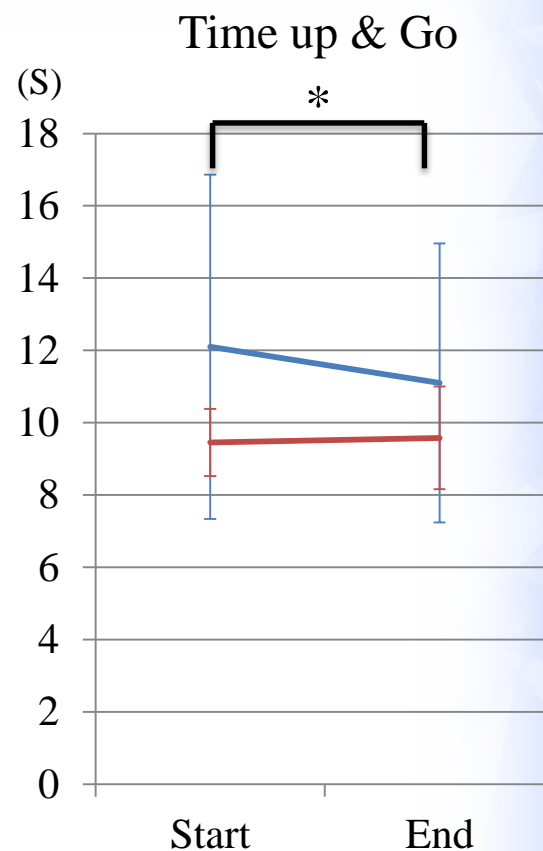
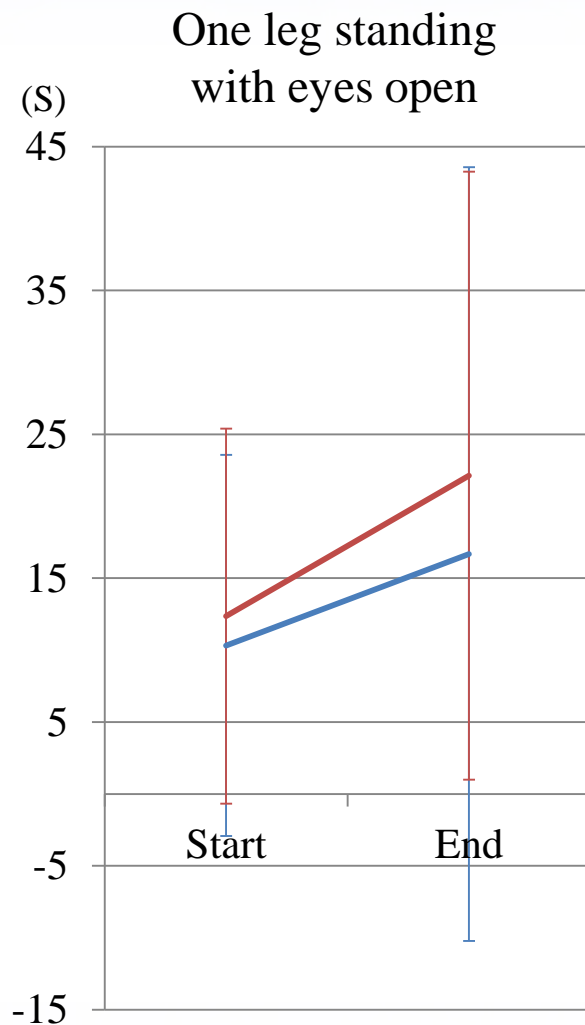
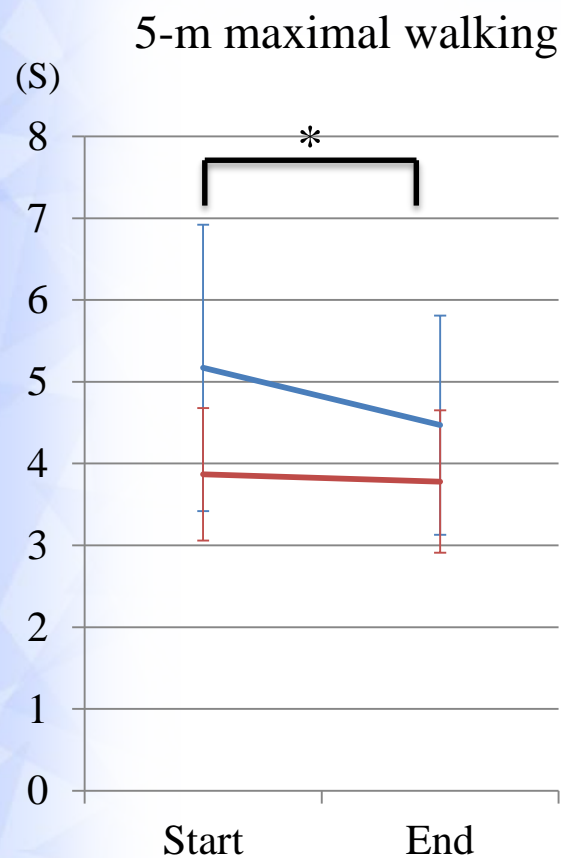
Control group



Presence or absence of fall	Intervention group N=17	Control group N=10
Falled	4(23.5%)	0(0%)
Likely to fall	11(64.7%)	1(10%)
Not falled	13(76.5%)	10(100%)



■ Comparison of physical measured value



— Intervention group N=17

— Control group N=10

* $P < 0.05$

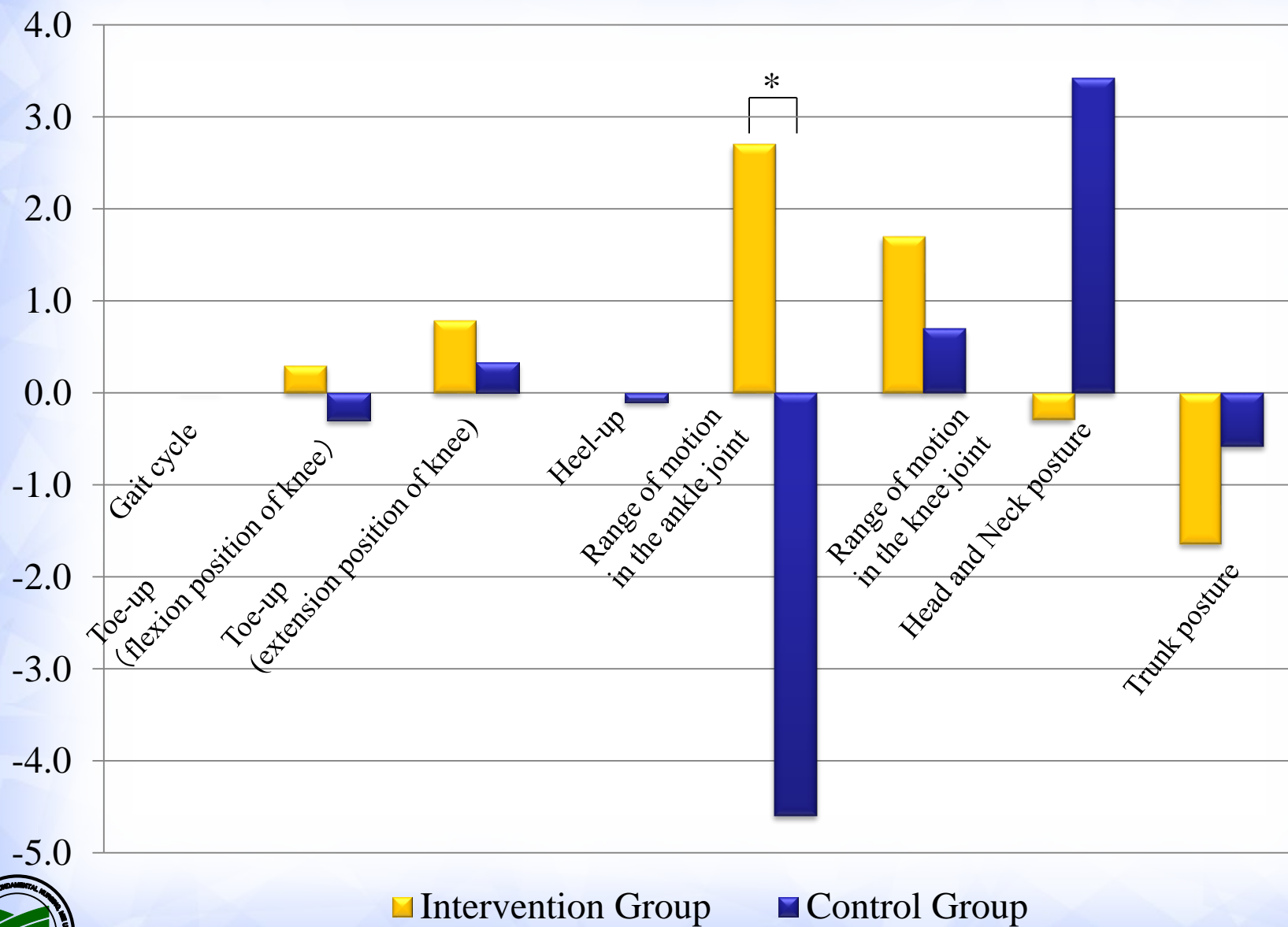


■ Comparison of physical measured value by motion analyzer

Measurement item	Intervention Group n=17		Control Group n=10	
Gait cycle	11	65%	2	20%
Toe-up (flexion position of knee)	9	53%	3	30%
Toe-up (extension position of knee)	7	41%	2	20%
Heel-up	6	35%	2	20%
Range of motion in the ankle joint	4	24%	0	0%
Range of motion in the knee joint	3	18%	2	20%
Head and neck posture	2	12%	1	10%
Trunk posture	2	12%	1	10%



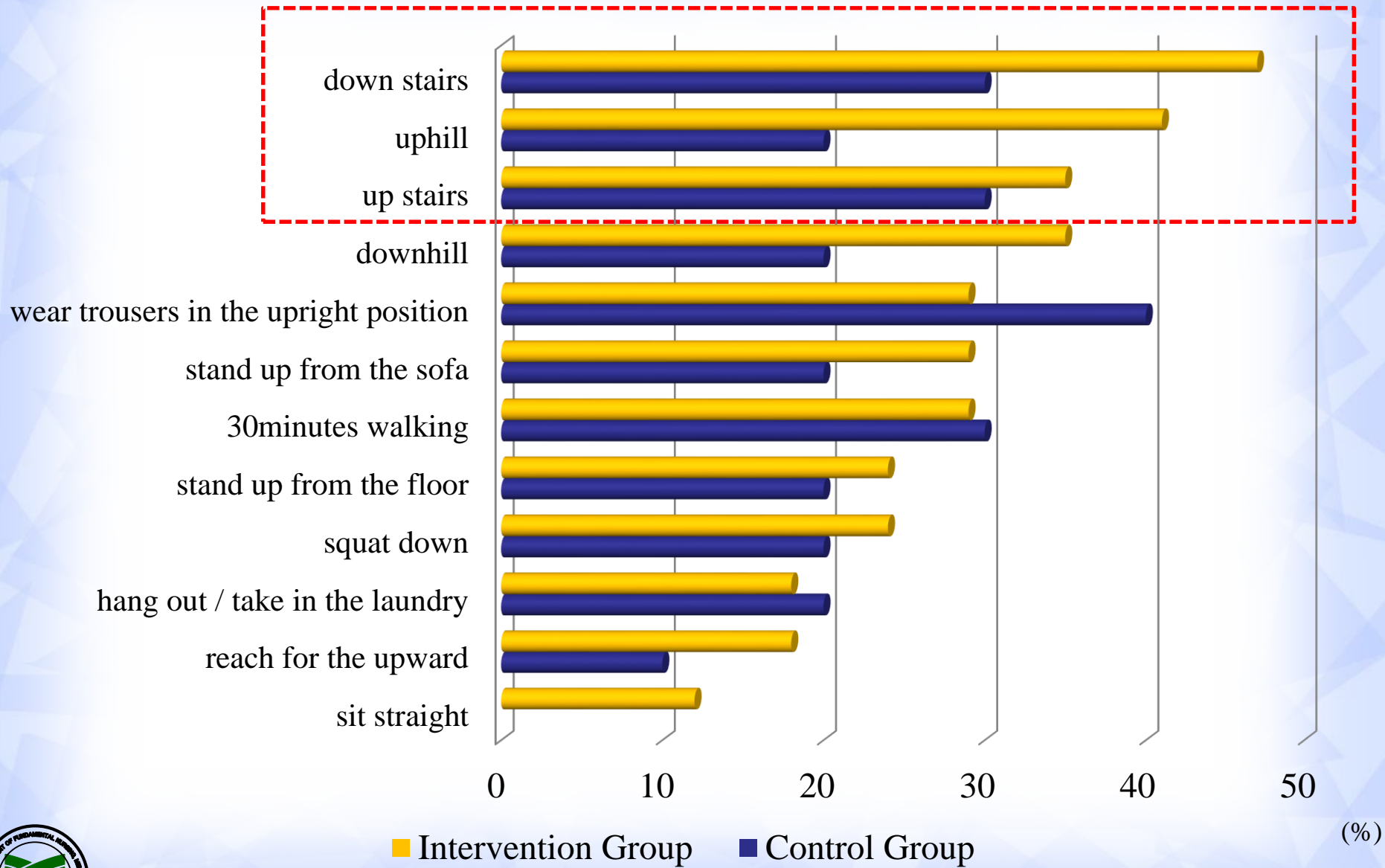
Comparison of physical measured value by motion analyzer



*P<0.05



Improvement change of the ADL



(%)



■ Improvement change of the ADL

Item of motion	Details of the improvement change
General motion	Easier to stand up planting one hand on something these days.
	Used to sit on a chair to wear trousers, but now wear them in upright position. Other 5 items
Stepping	Became able to go upstairs.
	Used to go downstairs sideways, but now go straight down step by step without holding on to a rail. Other 7items
Walking	Used to stumble on a flat surface, but do not fall any more.
	Easier to lift feet. The toes of shoes used to touch the ground but not anymore. Other 10 items



CONCLUSIONS

- ❑ **No significant difference confirmed in physical measured values for both groups.**
- ❑ **No significant difference confirmed in the change of physical measured values in gait for both groups. However the intervention group showed significant improvement in the range of motion in ankle joint comparing with the control group.**



CONCLUSIONS

- ❑ **The training frequency of the intervention group is higher and fewer people dropped out. It is considered that they were motivated by feedback of gait analysis result and regular interview with a nurse, and as a result, effects were given to significant improvement of 5m maximal walking and TUG. We would like to examine more effective feedback methods that can be utilized for exercise adherence.**



CONCLUSIONS

- ❑ **The rate of falling and likely to fall was higher in the intervention group. The intervention group is more aware of ADL improvement, and it is possible that the risk is increased with the expanded activity range. Therefore we think that more involvement to raise their attention when moving is needed.**

