Physical Performance Differences Associated with Falls in Older Daycare Users

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주간보호시설 노인의 낙상 경험에 따른 신체기능 차이 분석

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Abstract

Older adults attending daycare centers are more physically vulnerable than their community-dwelling peers, placing them at higher risk for falls. However, few studies have comprehensively examined fall risk factors in this population. To investigate physical and psychological characteristics associated with fall history in older adults using adult daycare services. A total of 78 older adults (mean age 83.2 ± 6.5 years) from four daycare centers participated in this cross-sectional study. Fall experience within the past year was recorded through interviews. Physical performance assessments included handgrip strength (HGS), knee extension strength (KES), knee joint position sense (KJPS), timed up and go (TUG), and functional reach. Fear of falling was evaluated using the Falls Efficacy Scale-International (FES-I). The fall-experienced group showed significantly lower KES and HGS, longer TUG times, greater joint position errors, and higher FES-I scores (all $p < 0.01$). Walking aid use was also more frequent in this group. Deficits in lower limb strength, mobility, and proprioception are associated with fall history. Fall prevention programs should prioritize functional strengthening and balance training for older adults in daycare settings.

1. Introduction

As the global population continues to age, the prevention of falls among older adults has become a pressing public health issue [1]. In South Korea, adult daycare centers serve a growing number of older adults with physical or cognitive limitations, now exceeding 200,000 users nationwide [2]. These individuals are typically more frail and dependent than community-dwelling older adults [3], yet most research on fall risk has focused on the latter group [4-5].

Falls in this population often result in serious injuries such as fractures or head trauma [6], leading to loss of independence, reduced quality of life, and increased healthcare costs [7]. Despite these consequences, few studies have comprehensively examined the physical characteristics associated with fall history among daycare center users.

This study aimed to compare physical performance characteristics—including muscle strength, mobility, balance, and proprioception—between older adults with and without a history of falls in adult daycare centers. The goal is to identify functional differences that can inform targeted fall prevention strategies for this high-risk population.

2. Methods

A cross-sectional study was conducted with 78 older adults (mean age 83.2 ± 6.5 years) recruited from four adult daycare centers in South Korea. Inclusion criteria included: age ≥ 65, independent ambulation, and MMSE-K ≥ 24 (Table 1). Participants were classified into fall-experienced (n=25) and non-fall groups (n=53) based on self-reported fall history in the past year. Physical performance was assessed using validated tools: handgrip strength (HGS), knee extension strength (KES), knee joint position sense (KJPS), timed up and go (TUG), and functional reach test (FRT). Psychological status was

measured using the Korean version of the Falls Efficacy Scale-International (FES-I).

[Table 1] General participant characteristics(N=78)

	Ovarall
Age(year)	83.24 ± 6.50
BMI(kg/m2)	24.15 ± 4.18
Sex(female)	64 (82.1%)

3. Results

Among the 78 older adults enrolled (mean age 83.2 years, 82.1% female), 32.1% reported at least one fall in the past year. Compared to the non-fall group, the fall-experienced group showed significantly lower handgrip strength (13.16 ± 5.70 vs. 17.46 ± 5.83 kgf, p = 0.003) and knee extension strength (11.68 ± 6.40 vs. 18.42 ± 8.43 kgf, p = 0.001). They also had greater errors in joint position sense (KJPS, p = 0.001), longer TUG times (median 16.79 vs. 12.5 seconds, p = 0.006), and higher fear of falling scores (FES-I, p < 0.001). Walking aid use was more frequent among fallers (60.0% vs. 26.4%, p = 0.004). These findings emphasize the physical and psychological vulnerabilities among older adults with fall history (Table 2).

[Table 2] Differences in Physical and Psychological Measures According to Fall Experience

Demographic features	Yes(n=25)	No(n=53)	p value
Fall experience (%)	25 (32.1)	53 (67.9)	
Age, yrs	83.76 ± 6.60	83.00 ± 6.50	0.633
Female, n (%)	23 (92.0)	41 (77.4)	0.116
Physical data			
HGS, kgf	13.16 ± 5.70	17.46 ± 5.83	0.003*
KES, kgf	11.68 ± 6.40	18.42 ± 8.43	0.001*
KJPS, °	9.15 ± 4.64	5.92 ± 3.31	0.001*
TUG, sec	16.79 [11.32, 23.91]	12.5 [9.53, 14.64]	0.006*
FRT, cm	10.0 [6.5, 14.25]	13.0 [9.0, 19.75]	0.052
Psychological factors			
FES-I	24.0 [21.0, 34.5]	19.0 [17.0, 24.0]	<0.001*

4. Conclusion

Older adults attending daycare centers experience a substantially higher fall rate compared to those living independently. This study identified several physical performance deficits—particularly in lower limb strength, mobility, proprioception, and balance—as being associated with fall history. Additionally, elevated fear of falling was observed among those who had previously fallen. These results support the importance of incorporating strength and mobility training into fall prevention programs for frail elderly populations. Interventions should particularly focus on improving knee strength and walking ability to reduce the risk of falls and related injuries.

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