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Original Article

Physical, mental, and social functioning in women age 65 and above with and without a falls history: An observational case-control study

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Introduction

Falls have important implications for older people through both direct repercussions such as fractures and head injuries, and through long-term consequences such as disability, lower health related quality of life, loss of independence, and decline in social participation1-4. Despite awareness of fall risk factors in the older population, there is a lack of knowledge about how falls are associated with the older person’s physical, mental, and social functioning which would help find effective methods for identifying rehabilitation needs in the older population to ensure appropriate follow-up. The aim was to investigate and compare functioning in women with and without a falls history. Methods: This was an observational case-control study. Study participants were fallers aged ≥65 years recruited consecutively from a hospital; age matched randomly selected community controls (fallers without contact with the healthcare system due to falls and non-fallers). Fallers were classified as once only fallers and recurrent fallers. Results: The sample constituted a group of older women with and without a falls history; 117 fallers from the Falls Clinic, and 99 fallers and 106 non-fallers community controls, median age 80 years. Both fallers from the clinic and the community had significantly lower functioning compared to non-fallers in all three domains. Recurrent fallers had poorer functioning compared to once only fallers. Conclusion: This study contributes to knowledge about older people’s functioning and disability in conjunction with a high fall-risk and highlights the importance of rehabilitation and prevention strategies that focus on early identification of disability in the older population regardless of falls history.

Abstract

Objectives: There is a lack of knowledge about how falls are associated with the older person’s physical, mental, and social functioning which would help find effective methods for identifying rehabilitation needs in the older population to ensure appropriate follow-up. The aim was to investigate and compare functioning in women with and without a falls history. Methods: This was an observational case-control study. Study participants were fallers aged ≥65 years recruited consecutively from a hospital; age matched randomly selected community controls (fallers without contact with the healthcare system due to falls and non-fallers). Fallers were classified as once only fallers and recurrent fallers. Results: The sample constituted a group of older women with and without a falls history; 117 fallers from the Falls Clinic, and 99 fallers and 106 non-fallers community controls, median age 80 years. Both fallers from the clinic and the community had significantly lower functioning compared to non-fallers in all three domains. Recurrent fallers had poorer functioning compared to once only fallers. Conclusion: This study contributes to knowledge about older people’s functioning and disability in conjunction with a high fall-risk and highlights the importance of rehabilitation and prevention strategies that focus on early identification of disability in the older population regardless of falls history.

Keywords: Falls, Functioning, Older women, Observational study

The authors have no conflict of interest.

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to investigate and compare functioning in women with and without a falls history.

Materials and methods

This study was carried out in the context of a longitudinal study on osteoporosis. Study participants were a group of fallers aged ≥65 years recruited consecutively from the Falls Clinic at Odense University Hospital in Denmark (FALLCLIN) and age matched randomly selected community controls (fallers without contact with the healthcare system due to falls (FALLCON) and non-fallers (NOFALL)). Of a randomly selected group of 3000 women living in the municipality of Odense 866 women stated they were interested in participating in the study. Controls were consecutively recruited to the study. Individuals not mobile enough to transfer from bed to chair with or without help were excluded from the study. This study complies with the World Medical Association Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects. The regional ethics committee at the Region of Southern Denmark approved the study (S-20110162). All participants provided informed written consent before participating in the study.

All participants were seen in the falls clinic and data were collected by two researchers/health professionals. The World Health Organization’s model the International Classification of Functioning, Disability, and Health (ICF) was utilized as a conceptual framework for understanding functioning and disability (i.e., body structure, body function, activity, and participation). The following aspects of functioning were studied: muscle strength assessed by handgrip strength measured with a dynamometer (Smedley, model 281128; Scandidact, Kvistgaard, Denmark) under standardized conditions using the best value of two attempts and the 30 second sit to stand test (STS), modified if participants had to use their arms to complete the test; basic mobility assessed by the Timed Up and Go test (TUG); gait speed assessed by the 4-meter walking test with and without a dual task condition of serial three subtractions - the participants walked with their preferred walking speed and used their customary walking aids in all walking tests (for walking tests the best value of three attempts were used); balance assessed by the 14-item Berg Balance Scale; cognition assessed by the Mini Mental State Examination (MMSE); symptoms of depression assessed by the Geriatric Depression Scale (GDS); activities of daily living (ADL) assessed by the Avlund Mobility-Tiredness Scale (Avlunds Mob-T). The framework of ICF also includes contextual factors (i.e., environmental and personal factors) which in this study included fear of falling assessed by the Falls Efficacy Scale-International (FES-I) and falls history over one year assessed with a self-reported questionnaire using a standardized definition of a fall. Additional contextual factors extracted from medical records were included to describe the sample (age, body mass index (BMI), medication, Charlson Comorbidity Index (CCI), and help with homecare or personal care).

Statistical analysis

Data were analyzed using SPSS version 19.0 for Windows (IBM SPSS Inc., Chicago, IL).

Ratio between controls (FALLCON and NOFALL) and cases (FALLCLIN) was set at 2:1. Sample size was based on an assumption of a significant difference of a 30% decrease in frequency between the case group and control group. For the study to have a power of 80% with a 0.05 significance level the sample had to contain 69 participants in the case group and 138 participants in the control group (69 in each group). When taking a 20% drop-out rate into account, 83 cases and 166 controls would have to be included in the study (83 in each group). Because this population was expected to have an annual mortality rate of 10% we aimed to recruit 100 participants in each of the three groups in the longitudinal study on osteoporosis to allow for attrition and withdrawals.

Significance level was set to 0.05. Descriptive characteristics of the three groups FALLCLIN, FALLCON, and NOFALL were compared using One-way ANOVA analyzes of variance to compare continuous variables and Kruskal-Wallis non-parametric test to compare categorical variables. To explore plausible differences in functioning between the three groups of women the One-way ANOVA of variance was used to compare means and the Mann-Whitney test was used to compare medians. For univariate analysis the independent t-test was used to compare means and the Mann-Whitney test was used to compare medians. We also explored differences in functioning between “once only fallers” and “recurrent fallers” in FALLCLIN group and FALLCON group. Women who reported more than one fall within the last 12 months were classified as recurrent fallers. The independent t-test was used to compare means and the Mann-Whitney test was used to compare medians between the two groups.

Results

The total sample constituted 322 women, FALLCLIN (n=117), FALLCON (n=99), and NOFALL (n=106) with an overall median age of 80 years [IQR 75-86]. Non-participants (n=78) from the Falls Clinic (i.e. those who declined participation, withdrew consent, or were excluded according to exclusion criteria), were significantly older than participants (median [IQR]: 83 years [77-89] vs. 81 years [75-86], p=0.021). Descriptive characteristics of the FALLCLIN, FALLCON, and NOFALL groups are presented in Table 1. Participants recruited from the falls clinic and controls with falls had increased number of comorbidities and medications and more assistance from home-helpers. Statistically significant differences were found in all areas of functioning between the three groups (Table 2). Furthermore the use of arms to complete the STS was more prevalent in fallers than non-fallers, 34% (32/95) in the FALLCLIN, 29% (28/97) in the FALLCON group, and 6% (6/104) in the NOFALL group respectively to use their
Functioning and falls history in older women

arm when standing up (p<0.001). Finally, the use of a walking aid in the walking tests was also more prevalent in fallers than non-fallers, 36% (31/87) in the FALLCLIN group, 29% (27/97) in the FALLCON group, and 5% (5/102) in the NOFALL group respectively (p<0.001).

When comparing functioning between “once only fallers” and “recurrent fallers” no statistically significant differences were found in the FALLCLIN group (Table 1). Descriptive characteristics of the three participating groups: Falls Clinic [FALLCLIN], community controls with falls history [FALLCON] and without falls history [NOFALL].

<table>
<thead>
<tr>
<th>Variable</th>
<th>FALLCLIN (n=117)</th>
<th>FALLCON (n=99)</th>
<th>NOFALL (n=106)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td>0.717</td>
</tr>
<tr>
<td>BMI (kg/m²), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td>0.829</td>
</tr>
<tr>
<td>Number of medications (n), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td>0.024</td>
</tr>
<tr>
<td>Charlson Comorbidity Index¹, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>≥3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homecare help, n (%)</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Personal care help, n (%)</td>
<td></td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

¹CCI=Charlson Comorbidity Index¹9 predicts the one-year mortality for a patient who may have a range of comorbid conditions, such as heart disease, AIDS, or cancer (a total of 21 conditions). Each condition is assigned a score of 1, 2, 3, or 6, depending on the risk of dying associated with each one. The severity of comorbidity was categorized into three grades: mild, with CCI scores of 0; moderate, with CCI scores of 1-2; and severe, with CCI score ≥3.

**Table 2.** Variables on functioning in the three participating groups: Falls Clinic [FALLCLIN], community controls with falls history [FALLCON] and without falls history [NOFALL].

<table>
<thead>
<tr>
<th>Group</th>
<th>FALLCLIN</th>
<th>FALLCON</th>
<th>NOFALL</th>
<th>p*</th>
<th>p†</th>
<th>p‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handgrip Strength (kg), mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sit to stand test (number), mean (SD)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timed Up and Go test (sec), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gait speed – 4 meters (m/s), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gait speed dual task (m/s), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bergs Balance Scale (score), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mini Mental State Examination (score), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geriatric Depression Scale (score), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avlunds Mobility-Tiredness Scale (score), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falls Efficacy Scale (score), median [IQR]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*FALLCON vs. NOFALL. †FALLCLIN vs. FALLCON. ‡FALLCLIN vs. NOFALL.
3) whereas “recurrent fallers” had significantly poorer functioning in regards to symptoms of depression, ADL, and fear of falling in the FALLCON group (Table 3). “Once only fallers” from the FALLCLIN group had significantly poorer functioning in regards to gait speed (p=0.015), gait speed dual task (p=0.049), cognition (0.027), symptoms of depression (p<0.001), ADL (p=0.037), and fear of falling (p=0.006) compared to “once only fallers” from the FALLCON group. There was no statistically significant difference between any of the outcomes recorded by the two groups of “recurrent fallers”.

Discussion

This observational study explored functioning and contextual factors in women with falls attending a falls clinic compared to women from the community with and without falls. The study demonstrated that there are significant differences in functioning when comparing older women with or without a falls history. These findings are supported by studies on fall risk factors where low functioning in regards to muscle strength, balance, gait, cognition, depression, ADL, and fear of falling are associated with increased risk of falling. These results might apply especially for older women. Compared to a younger group of older women (age 60-69 years) the study population would be expected to have lower physical, mental, and social functioning due to the aging process. We were not able to recruit the oldest women from the Falls Clinic. If the oldest group had been included in the study the functioning in women from the

<table>
<thead>
<tr>
<th>Group</th>
<th>FALLCLIN</th>
<th>FALLCON</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Once only fallers</td>
<td>Recurrent fallers</td>
</tr>
<tr>
<td>Variables</td>
<td>n</td>
<td>N</td>
</tr>
<tr>
<td>Handgrip strength (kg), mean (SD)</td>
<td>30</td>
<td>18.1 (6.9)</td>
</tr>
<tr>
<td>Sit to stand test (number), mean (SD)</td>
<td>31</td>
<td>8.9 (3.3)</td>
</tr>
<tr>
<td>Timed up and go test (sec), median [IQR]</td>
<td>32</td>
<td>11.6 [9.6-19.7]</td>
</tr>
<tr>
<td>Gait speed – 4 meters (m/s), median [IQR]</td>
<td>29</td>
<td>0.88 [0.70-1.00]</td>
</tr>
<tr>
<td>Gait speed dual task (m/s), median [IQR]</td>
<td>27</td>
<td>0.67 [0.46-0.80]</td>
</tr>
<tr>
<td>Geriatric Depression Scale (score), median [IQR]</td>
<td>34</td>
<td>4 [2-6]</td>
</tr>
<tr>
<td>Avlunds Mobility-Tiredness Scale (score), median [IQR]</td>
<td>38</td>
<td>3 [1-4]</td>
</tr>
<tr>
<td>Falls Efficacy Scale-I (score), median [IQR]</td>
<td>34</td>
<td>33 [21-40]</td>
</tr>
</tbody>
</table>

Table 3. Functioning in “once only fallers” and “recurrent fallers” in the group of women from the Falls Clinic [FALLCLIN] and women from the community with a falls history [FALLCON].
factors on falls over time to identify patterns in falls and to inform the design of fall preventive interventions. One way of addressing this would be to perform a longitudinal study in order to get knowledge about variation over time in functioning in older women with and without falls history.

**Conclusion**

Low physical, mental, and social functioning was distinctive for older women with a falls history. Early identification of disability should be part of community based prevention and rehabilitation strategies in the older population regardless of falls history. Particular emphasis in declining mental function should be considered as this is a strong indicator for clinic attendance.

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**References**

7. Hotchkiss A, Fisher A, Robertson R, Ruttencutter A, Schuffert J, Barker DB. Convergent and predictive validity of three scales related...
8. Thomson K. Odense Fallers and Osteoporosis Study - Assessment of osteoporosis among older women presenting with falls. University of Southern Denmark University of Southern Denmark; 2014.