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Chair rise capacity and associated factors in older home-care clients

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Abstract
Aims: The aim of this study was to investigate the ability of older home-care clients to perform the five times chair rise test and associated personal characteristics, nutritional status and functioning.

Methods: The study sample included 267 home-care clients aged ≥75 years living in Eastern and Central Finland. The home-care clients were interviewed at home by home-care nurses, nutritionists and pharmacists. The collected data contained sociodemographic factors, functional ability (Barthel Index, IADL), cognitive functioning (MMSE), nutritional status (MNA), depressive symptoms (GDS-15), medical diagnoses and drug use. The primary outcome was the ability to perform the five times chair rise test. Results: Fifty-one per cent (n=135) of the home-care clients were unable to complete the five times chair rise test. Twenty-three per cent (n=64) of the home-care clients had good chair rise capacity (≤17 seconds). In a multivariate logistic regression analysis, fewer years of education (odds ratio [OR] = 1.11, 95% confidence interval [CI] 1.04–1.18), lower ADL (OR = 1.54, 95% CI 1.34–1.78) and low MNA scores (OR = 1.12, 95% CI 1.04–1.20) and a higher number of co-morbidities (OR = 1.21, 95% CI 1.02–1.43) were associated with inability to complete the five times chair rise test. Conclusions: Poor functional mobility, which was associated with less education, a high number of co-morbidities and poor nutritional status, was common among older home-care clients. To maintain and to prevent further decline in functional mobility, physical training and nutritional services are needed. (NutOrMed, ClinicalTrials.gov Identifier: NCT02214758)

Key Words: Older people, home-care clients, physical functioning, chair rise capacity

Introduction
Chair rising is an important daily activity and requires lower extremity muscular strength and postural control [1,2]. Muscular strength correlates with functional tasks and activities of daily living and contributes to good postural control [2,3]. The chair rise test is a commonly used practical instrument designed to measure the muscular strength and postural control of older people [4,5].

Demand for home-care services increases with the ageing of the population and ensuing problems in functioning, mobility and activities of daily living [6]. Functional disabilities without enough supporting services may speed up the transition from home to residential care. Early recognition of physical disabilities is important for preventive intervention [7].

Modifiable lifestyle factors, such as nutrition and exercise, are the key factors modifying progression of disabilities [8]. Most previous studies have focused on describing home-care clients able to perform the five times test chair rise test and how to improve it [7]. The aim of this study was to assess the ability of older home-care clients to perform the five times chair rise test and associated personal characteristics, nutritional status and functioning.

Methods
The present study is a part of a population-based multidisciplinary intervention study, NutOrMed, which focused on nutritional, functional and oral health...
interventions. The participants were home-care clients aged ≥75 years living in three Finnish cities in Eastern and Central Finland. A random sample of 250 home-care clients was taken from community I (105,141 inhabitants), a random sample of 75 home-care clients was taken from community II (20,224 inhabitants) and a total sample of 115 home-care clients came from community III (7524 inhabitants). Of these home-care clients, 300 gave written consent to participate, and a total of 267 were able to attend all of the baseline interviews in 2013. The home-care clients were interviewed at home by trained nurses, nutritionists, dental hygienists and pharmacists. If a home-care client had difficulty answering the questions, for example because of a cognitive impairment, the interview data were supplemented by interviewing a caregiver or home-care nurse. Details of the NutOrMed study design are described elsewhere [9]. The study protocol was approved by the Research Ethics Committee of the Northern Savo Hospital District.

Physical performance

Chair rise capacity was assessed with the timed five times chair rise test [4]. The home-care clients stood up from the chair (body straight and knees fully extend) and sat right back down into the chair (back touching the backrest of the chair) five times as fast as possible without using hands to help. The test started with the signal ‘now’ and ended when the participant stood up for the fifth time. The height of the seat of the chair was about 45 cm. The chair had to have a backrest but no armrest. The duration of the performance was measured with a stopwatch with 0.1 second accuracy. The investigator demonstrated the test, and the home-care client tested one chair rise beforehand. During the test a solid leg position was secured, and the arms were to be kept folded across the chest. The home-care clients were divided into two groups on the basis of their ability to complete the chair rise test: able to perform the chair rise test and unable to perform it. The definition for ‘unable to perform the chair rise test’ was inability to complete the test because of not being able either to stand up without the help of hands or to rise five times. For those home-care clients who were able to perform the chair rise test, the definition for good performance was five chair rises completed in <17 seconds according to previous studies [10,11].

Functioning and health status

Sociodemographics, functioning, cognition and mood were determined in interviews by home-care nurses. Sociodemographics included years of education and living arrangements (living alone or living with spouse or relatives). Activities of daily living (ADL) were measured using the 10-item Barthel Index (scale 0–100) [12]. The Barthel Index assess the extent of independence while performing basic activities of daily living, such as eating, washing, getting around and sphincter control. Instrumental activities of daily living (IADL) were assessed with the eight-item Lawton and Brody Scale (scale 0–8) [13]. This measure includes questions on using the telephone, grocery shopping, preparation of meals, housekeeping, doing laundry, mode of transportation, taking care of drugs and managing money. Cognition was assessed by the Mini-Mental State Examination (MMSE; scale 0–30) and mood by the 15-item Geriatric Depression Scale (GDS-15) [14,15]. Higher scores indicate better functioning, cognitive functioning and mood.

A nutritionist assessed nutritional status using the Mini Nutritional Assessment (MNA) [16], which has been designed to screen nutritional risk, especially in old people in different settings. The MNA is composed of four parts: (1) anthropometrical measurements, (2) global assessment, (3) dietary questionnaire and (4) subjective assessment. The full MNA test includes 18 questions, and the total score is 30 points. A score of <17 points indicates protein-energy malnutrition (PEM; in this study called ‘undernutrition’). A score of 17–23.5 points indicates that the person is at risk for PEM, and a score of >23.5 points classifies the subject as being well nourished. In this study, nutritional status was classified as follows: a MNA score of <24 indicates malnutrition or a risk of malnutrition. In regression analysis, MNA was used as a continuous variable.

The medical diagnoses of the participants were verified by a physician specialised in geriatrics. A modified version of the Functional Comorbidity Index (FCI) was used to compute co-morbidity [17] using data on 13 medical conditions: (1) rheumatoid arthritis and other inflammatory connective tissue diseases, (2) osteoporosis, (3) diabetes, (4) chronic asthma or chronic obstructive pulmonary disease (COPD), (5) coronary artery disease, (6) heart failure, (7) myocardial infarction, (8) stroke, (9) depressive disorder, (10) visual impairment, (11) hearing impairment, (12) Parkinson’s disease and (13) obesity (body mass index >30 kg/m²). [18]. The presence of each of these conditions gave one score point, and a higher FCI sum score represented greater co-morbidity. The number of prescription and over-the-counter drugs used regularly and as needed (within last week) was recorded by a pharmacist on the basis of an in-home interview. Use of ≥10 drugs regularly or as needed was defined as excessive polypharmacy [19].
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Statistical analysis

The characteristics of the home-care clients were summarized using percentages, means and standard deviations (SD). The chi-square test and the t-test were used for statistical comparisons between home-care clients able to complete the five times chair rise test and home-care clients unable to complete it. Multivariate logistic regression analysis was employed to compare home-care clients able to complete the chair rise test and home-care clients unable to complete it. The data were analysed using IBM SPSS Statistics for Windows v19.0 (IBM Corp., Armonk, NY).

Results

A total of 267 home-care clients participated, of whom 72% (n=193) were women (Table I). The mean age of the participants was 84.5 years (SD=5.2 years). The chair rise test was completed by 49.4% (n=132) of the home-care clients. The mean chair rise test time for those home-care clients able to complete the test was 18.6 seconds (SD=9.05). Of the home-care clients who were able, 23% (n=64) had good chair rise capacity (≤17 seconds).

On the other hand, 50.6% (n=135) of the home-care clients were unable to complete the five times chair rise test (Table I). Home-care clients unable to complete chair rise test more often had fewer years of education, lower ADL, IADL, MMSE and MNA scores, higher number of co-morbidities and a history of stroke than those able to complete the five times chair rise test. In the multivariate logistic regression analysis, fewer years of education (OR=1.11, 95% CI 1.04–1.18), lower ADL (OR=1.54, 95% CI 1.34–1.78) and MNA scores (OR=1.12, 95% CI 1.04–1.20) and a higher number of co-morbidities (OR=1.21, 95% CI 1.02–1.43) were associated with the inability to complete the chair rise test (Table II).

Discussion

The inability to complete the five times chair rise test was common among home-care clients, and it was associated with less education, a high number of co-morbidities and poor nutritional status. Home-care clients’ inability to complete the five times chair rise test has not been described previously. The proportion of people with the inability to complete the five times chair rise test was 15% higher than in a previous Finnish study among older people [11], which is concerning, since chair rise difficulty predicts a decline in mobility and a risk of falling [3,20]. Buatois et al. found that in addition to the inability to
complete the chair rise test, longer chair rise test times were also associated with recurrent falls.

A new finding was that among home-care clients, chair rise capacity was associated with malnutrition or a risk of malnutrition. This is an important finding because the number of home-care clients is rapidly growing, and the prevalence of risk of malnutrition/malnutrition is very high among this vulnerable population [21]. Similar kinds of positive associations between MNA nutritional status and lower body strength as assessed with the chair stand test have been shown among older people in a study of non-insulin-dependent diabetics [22]. The impact of nutrition on muscle health during ageing has been investigated in recent years, especially the role of adequate protein intake [23]. Therefore, maintaining a good nutritional status is critical to preserving muscular strength and functional capacity among older people.

We also found an association between less education and the inability to complete the chair rise test. This association between less education and functional limitations among older people is in accordance with the findings of Welmer et al. among community dwellers aged 60–80 years [24] and might be explained by lower income and an unhealthy lifestyle which may result in greater morbidity [25].

Burton et al. reviewed physical activity interventions among home-care clients [7]. Seven out of eight reviewed studies showed improvement in at least one outcome measured during physical activity intervention. Most of the studies included balance and strength exercise interventions. However, evidence of maintaining sufficient physical functioning in older people with a wide range of health problems is limited because of the small sample sizes and different interventions and outcome measures [7]. How these interventions should be incorporated into home-care services needs to be solved. It seems to be challenging for home-care personnel to activate their clients’ physical functioning. This has not been included in their traditional responsibilities. So, home-care personnel need training and guidance to be able to support home-care clients’ individual needs in maintaining mobility and functionality.

The strengths of this study are its population-based design, the use of validated instruments and its multidisciplinary approach. The three municipalities involved represent the Finnish population of home-care clients; the sex- and age-related coverage of home care is in accordance with the statistics of the National Institute for Health and Welfare [26]. We did not use exclusion criteria regarding age, morbidity or functionality. We used only the five times chair rise test to assess physical performance, which has proven to be a good predictor of mobility disability in older adults [10,11]. Due to the cross-sectional nature of this study, we are not able to determine the causality between factors and physical status.

Half of the home-care clients were unable to perform the five times chair rise test to assess physical performance, which has proven to be a good predictor of mobility disability in older adults [10,11]. Due to the cross-sectional nature of this study, we are not able to determine the causality between factors and physical status.

Table II. Logistic regression analysis comparing home-care clients able to complete the five times chair rise to home-care clients unable to complete the five-time chair rise test.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Univariate OR (95% CI)</th>
<th>Multivariate OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (female)</td>
<td>0.61 (0.35–1.05)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>1.05 (1.00–1.10)*</td>
<td>1.11 (1.04–1.18)*</td>
</tr>
<tr>
<td>Education (years)</td>
<td>1.09 (1.03–1.15)*</td>
<td>1.11 (1.04–1.18)*</td>
</tr>
<tr>
<td>ADL (score)</td>
<td>1.50 (1.32–1.70)*</td>
<td>1.54 (1.34–1.78)*</td>
</tr>
<tr>
<td>MNA (score)</td>
<td>1.19 (1.12–1.27)*</td>
<td>1.12 (1.04–1.20)*</td>
</tr>
<tr>
<td>GDS-15 (score)</td>
<td>1.18 (1.08–1.29)*</td>
<td>1.21 (1.02–1.43)*</td>
</tr>
<tr>
<td>FCI</td>
<td>1.22 (1.06–1.40)*</td>
<td></td>
</tr>
<tr>
<td>Heart disease</td>
<td>1.18 (0.72–1.93)</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>2.45 (1.38–4.36)*</td>
<td></td>
</tr>
<tr>
<td>Asthma/COPD</td>
<td>1.06 (0.59–1.92)</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.04 (0.62–1.76)</td>
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</tr>
<tr>
<td>Dementic disease</td>
<td>0.90 (0.55–1.47)</td>
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<tr>
<td>Excessive polypharmacy</td>
<td>1.37 (0.84–2.22)</td>
<td></td>
</tr>
</tbody>
</table>

Multivariate analysis: Forward Wald selection. Only variables that entered the model are shown.

*p-value <0.05.

OR: odds ratio; CI: confidence interval; ADL: Activities of Daily Living (Barthel).

Declaration of conflicting interests

The authors declare that there is no conflict of interest.
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References


