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| **Question:** **In older adults with dementia and a history of falls, are balance exercises more effective than no prescribed balance exercise program for reducing fall risks?** | **Search Databases:**  Pubmed  CINAHL |

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| Author/  Year | Purpose/Design/  Subjects | Intervention | History of Falls | Measurements | Outcomes | Limitations/  Comments |
| Toulette et al, 2003 | **Purpose:**to develop a physical training program to improve balance in dependent, demented, people with a history of falling, and so decrease falls and increase autonomy  **Design**:Randomized Crossover design  **Subject:** 20 elderly demented patients living at home or institutions  aged 81.4 **(+/-)** 4.7. Their mini  mental state (MMSE) score was 16.3 **(+/-**6.5) with a history of at least 2 previous falls | Subjects were  Randomly allocated to either the control (CG) or training (TG) groups, with 10 subjects in each group.  **Control Group:** Daily routine only  **Training Group***:* Physician led activity sessions where, subjects did group exercises to develop muscular  strength, proprioception, static and dynamic balance  and flexibility for 16 weeks | Yes | All subjects performed the following 4 tests before and after training: Get up and go, Chair sit and reach, Walking speed over 10 m, and Posturography platform QFP. | Overall, balance did not change in the CG (p<0.01). Balance was significantly improved in the TG. During the intervention period 6 falls occurred in CG and 0 falls for TG. | Study has a small sample size.  The Mini Mental State score for the CG decreased significantly and was unchanged for the TG possibly due to the “group effect.”  Parameters of the exercise program were not clearly defined enough to be replicated. Only 5 participants had a specific disease that impaired cognition i.e. Alzheimer’s disease, Parkinson’s, and history of CVA. |
| Rolland et al, 2007 | ***Purpose:*** To determine whether an exercise  program would reduce ADL decline in people with Alzheimer’s Disease  living in nursing homes over a 12-month period  ***Design:*** RCT  ***Subjects:*** 134 ambulatory subjects in nursing homes with mild-severe Alzheimer’s disease age 83(+/-)7.4 with MMSE=8.8(+/-) 6.6 | **Control Group:** 67 subjects that received routine medical care  **Intervention Group:** Group exercise that consisted of walking, LE strengthening and balance exercises for 60 minutes 2x/week for 12 months | Yes | Measured at baseline/6 months/12 months  Physical Performance: KATZ index of ADLs, 6-m walking speed, get up and go tests, one-leg balance tests  Other Outcome Measures:  Behavioral disturbance/depression/nutritional status: NPI, The Montgomery Asberg depression rating scale and mini-nutritional assessment | Slowed the progression of the inability to perform ADLs in people with AD living in nursing homes. There was in improvement in mean walking speed but had no significant effect on nutritional status, behavioral disturbance, or depression measures. The overall exercise program was safe. | Exclusively had participants with Alzheimer’s disease.  Exercise adherence was a significant predictor  of change in ADL score, and ADL scores of participants with high adherence did not decrease significantly during the intervention period. This result may be due to the fact that subjects with the slowest decline in function were able  to adhere to exercise rather than that high adherence to  exercise caused a slower decline in function. |
| Santana-Sosa et al. 2008 | **Purpose:** To determine the effects of a 12-week training program (including resistance,  flexibility, joint mobility and balance/coordination exercises) for Spanish patients with Alzheimer’s Disease on their overall functional capacity and ability to perform ADLs.  **Design:** Randomized Block  **Subjects**: N=16 (M=6, F=10)  Age: intervention group 76(+/-)4; Control group 73(+/-)4 from residential nursing home  MMSE= 20.1 (+/-) 2.3 for intervention group  19.9(+/-) 1.7 for control group | **Control Group:** Received routine nursing/  medical care  Intervention Group: 36 programmed training sessions with group of 4 residents by exercise scientist; walking, gentle stretching exercises, joint mobility exercises, resistance training and coordination/balance exercises (with music) for 75 min 3x/wk | No | Measured at baseline and after 12 weeks  The Senior Fitness Test  ADLs (Katz ADL score; Barthel index)  Gait and balance abilities (Tinetti Scale) | Adherence to training: 98.9%  A short-term (12-week) training program  for patients with Alzheimer’s that included resistance, joint mobility and coordination  exercises significantly improved their overall functional  capacity and their ability to perform ADLs independently.  Compared between groups (p<0.05): arm curl test, chair stand tests, KATZ ADL sore, Barthel index  Timed effect (within group) p<0.01: Senior fitness test and Tinetti | Results strengthens the rationale for patients with Alzheimer’s disease who live in nursing homes to enter training programs as soon as possible given the early benefits that can be obtained with this intervention.  The study exclusively had participants with Alzheimer’s disease. Study incorporated music into their t  Small sample size |
| Rosendahl et al, 2008 | **Purpose:** To evaluate the effectiveness of a high-intensity functional exercise program in reducing falls in residential care facilities.  **Design:** RCT  **Subjects:**  N=100; Older people (mean age 84.2) diagnoses as dementia by DSM criteria living in residential care facilities; mean MMSE: 16.0 | **Control Group:** Activities performed while sitting i.e. watching films, reading, singing  **Intervention Group:** PT assisted strength and balance exercises based on the HIFE program which is based on exercising in functional  weight-bearing positions. 5 times every 2 weeks for 45 minutes over 3 months | Yes | Measured at baseline and after 6 months.  Fall rate and the proportion of participants sustaining a fall | In a subgroup interaction analysis, the exercise group had a lower fall rate than the control group (p=0.03) | The everyday functional weight bearing exercises i.e. standing from a chair, may have transferred into improvements in physical function and daily activities.  Those with dementia were not the focus of the study. Types of dementia were not specified. Out of the 191 initial randomized subjects, 100 were diagnosed with dementia. |
| Pitkala et al. 2013 | **Purpose:** To investigate the effects of intense and long-term  exercise on the physical functioning and mobility of home-dwelling patients with AD and to explore its effects on the use and costs of health and social services  **Design:** RCT  **Subjects:** Home-dwelling patients with Alzheimer’s living with spousal caregivers. N=210; mean age=78; mean MMSE: 18.0 | **Control Group:** Routine medical care, oral and written advice on nutrition and exercises methods  **Intervention Group**: Home exercise (HE) group given by one PT and group-based exercise (GE) group given by 2 PTs during 4 hour adult day care sessions. Both groups did activity for 60 minutes 2/wk for 12 months. | Yes | The Functional Independence  Measure (FIM), the Short Physical Performance Battery, and information on the use and costs of social and health care services. | Measured at baseline, 3, 6, and 12 months.  Deterioration was significantly  slower in the intervention groups than in the control group (p<0.050. The significant mean difference between the groups was apparent at 6 month in the Home Exercise group, and  maintained after 12 months. The home exercise group was more successful overall compared to the group exercise intervention and control group. | Exercise interventions for GE may not be feasible for all adult day cares i.e. climbing a ladder, leg press machine.  The small sample size and the number of dropouts may not provide sufficient power to detect differences between the group exercise group and the Control group.  The study was not blinded |

Resources:

1. Toulotte C, Fabre C, Dangremont B, Lensel G, Thevenon A. Effects of physical training on the physical capacity of frail, demented patients with a history of falling: A randomised controlled trial. *Age Ageing*. 2003;32(1):67-73.
2. Rolland Y, Pillard F, Klapouszczak A, et al. Exercise program for nursing home residents with alzheimer's disease: A 1‐Year randomized, controlled trial. *J Am Geriatr Soc*. 2007;55(2):158-165.
3. Santana-Sosa E, Barriopedro M, Lopez-Mojares LM, Pérez M, Lucia A. Exercise training is beneficial for alzheimer's patients. *Int J Sports Med*. 2008;29(10):845.
4. Rosendahl E, Gustafson Y, Nordin E, Lundin-Olsson L, Nyberg L. A randomized controlled trial of fall prevention by a high-intensity functional exercise program for older people living in residential care facilities. *Aging clinical and experimental research*. 2008;20(1):67-75.
5. Pitkälä KH, Pöysti MM, Laakkonen M, et al. Effects of the finnish alzheimer disease exercise trial (FINALEX): A randomized controlled trial. *JAMA internal medicine*. 2013;173(10):894-901.