Monica Anderson

PATH-IN Capstone

Search Strategy/Literature Review Notes

Knee OA, Balance Training, Falls Risk and Prevention

SEARCH STRATEGY – Balance Training to Prevent Falls for Individuals with Knee OA

Terms used to guide the search strategy			
Patient/Client Group	**I**ntervention (or Assessment)	**C**omparison	**O**utcome(s)
knee osteoarthritis knee arthritis knee OA degenerative joint disease of knee DJD of knee	balance training balance program balance	N/A	falls falls risk falls prevention

Final search strategy:

For PubMEd

1. "knee osteoarthritis" OR knee osteoarthritis[MeSH Terms] OR "knee arthritis" OR "degenerative joint disease" OR (DJD AND KNEE)
2. balance training OR balance program OR balance[MeSH Terms]
3. falls OR “falls risk” or “falls prevention”
4. #1 AND #2 AND #3 – **11 Results**

Pedro – **6 results** with “osteoarthritis” “balance” “falls”

4 relevant to search:

Sumaiyah M, Tan MP, Kamaruzzaman SB, NG C. Physical therapies for improving balance and reducing falls risk in osteoarthritis of the knee: a systematic review. *Age and Ageing*. 2015; 44:16-24. Doi: 10.1093/ageing/afu112

- This systematic review evaluated all eligible studies that included balance outcomes and falls risk following physical therapy in individuals with knee OA.
- The authors considered all interventions that involved an element of physical training such as walking, strength training, endurance training and physical therapy interventions
- Studies that employed objective balance-related outcomes and/or falls risk were included.
- Findings conveyed that strength training, *Tai Chi and aerobics exercises improved balance and falls risk in older individuals with knee OA*, while water-based exercises and light treatment did not significantly improve balance outcomes.

- Interventions
    - Tai Chi was used in three studies, while the remaining employed water- based exercise, walking programme, aerobic and resistance exercises, home-based progressive and manual physical therapy of strength training, weight-bearing exercises, high-speed and slow-speed power training, squat exercise with whole-body vibration, aquatic and land-based exercise, neuromuscular electrical stimulation (NMSE) with strength training. and light therapy (exposure to 890 nm radiation).
    - No *evident balance training programs* evaluated
    - Outcomes included fear of falling score, gait velocity, and STS time.
- "Our systematic review of 15 studies that evaluated balance and falls risk measures following physical interventions in patients with knee OA has found that strength training exercises, Tai Chi and aerobics exercises significantly improved balance and falls risk outcomes in 11 of the 15 studies."

Ratsepsoo M, Gapeyeva H, Sokk J, Ereline J, et al. Leg extensor muscle strength, postural stability and fear of falling after 2-month home exercise program in women with severe knee joint osteoarthritis. *Medicina (Kaunas*). 2013; 49(8):347-353.

- Aim of study was to compare the leg extensor muscle strength, the postural stability, and the fear of falling in the women with severe knee joint osteoarthritis (OA) before and after a 2-month home exercise program (HEP).
- The isometric peak torque (PT) of the leg extensors and postural stability characteristics when standing on a firm or a foam surface for 30 seconds were recorded (using force plate). The fear of falling and the pain intensity (VAS) were estimated.
- inclusion criteria for the subjects were as follows: diagnosis of stage 3–4 knee joint OA, scheduled unilateral TKA, independent walking without a walking aid, and motivation to perform the HEP.
- HEP composed by a physiotherapist was oriented toward muscle strengthening exercises with an elastic band, stretching, *balance, and step exercises.*
- The women with knee joint OA demonstrated a *significant decrease in the sway length when standing on a foam surface after the 2-month HEP (P<0.05).* The postural stability when standing on a firm surface was not influenced by the home exercise program
- The Modifed Falls Efficacy Scale (MFES) score did not differ significantly after the 2-month HEP compared with that before the HEP (8.2±0.6 and 7.9±0.6 points, respectively; *P*>0.05).

Kim H, Yun DH, Yoo SD, et al. Balance control and knee severity. *Ann Rehabil Med.* 2011; 35:701-709.

- This study included 80 knee OA patients divided into two groups. Those with a KL grade ≤2 were labeled the 'mild group' and those with a KL grade ≥3 were labeled the 'moderate-to-severe group'. All subjects were evaluated for balance control ability to determine if there was a correlation with OA severity.
- Findings suggest that patients with moderate to severe OA have more deficits in balance control than those with mild disease.
- Evaluation of balance control and education aimed at preventing falls would be useful to patients with knee OA.

Arnold Cm, Faulkner RA, Gyurcsik NC. The relationship between falls efficacy and improvement in fall risk factors following an exercise plus educational intervention for older adults with hip osteoarthritis. *Physiotherapy Canada*. 2010; 63(4):410-420.

- Fifty-four older adults with hip osteoarthritis and at least one risk factor for falls received aquatic exercise twice weekly plus education once weekly (EE) or aquatic exercise only, twice weekly (EO), for 11 weeks.
- Mastery experience was developed by participants' learning strategies to prevent falls and consistently applying these strategies in day-to-day tasks. *Participants also practiced tasks in the class setting, such as getting up from the floor, reaching, and stepping over obstacles, which contributed to mastery experiences*.
- The group facilitator provided constructive feedback as well as information on the potential losses resulting from non-adherence to exercise and the potential long-term gains from adherence.
- Lower falls efficacy at baseline was significantly associated with balance improvement as measured by the MCTSIB (Spearman r 1⁄4 0.45; $p < 0.05$) and with falls- efficacy improvement as measured by the ABC (r 1⁄4 0.63; $p < 0.01$) for EE participants, but not for EO participants (see Table 2).
- Significant *differences in fall-risk change scores were found between the low- and high-falls- efficacy participants in the EE group*, but no significant differences were found among participants in the EO group.

Rogers MW, Tamulevicus N, Semple SJ, Krkeljas Z. Efficacy of home-based kinesthesia, balance and agility exercise training among persons with symptomatic knee osteoarthritis. *Journal of Sports Science and Medicine*. 2012;11(4):751-758.

- Pedro Score 6/11. Level 1b evidence.
- Single-blind factorial (four arm) RCT
- Study investigated the efficacy of a home-based kinesthesia, balance and agility (KBA) exercise program to improve symptoms among individuals age ≥ 50 years with knee osteoarthritis (OA).
- Forty-four persons were randomly assigned to 8-weeks, 3 times per week KBA, resistance training (RT), KBA + RT, or Control. KBA utilized walking agility exercises and single-leg static and dynamic balancing.
- Outcomes included 15 m get up & go walk (GUG)
    - The RT group demonstrated significant improvement ($p = 0.02$) on the GUG, decreasing time by 8%, *while the KBA+RT group had a near significant 11% improvement ($p = 0.053$). GUG improvement for KBA (6.8%; $p = 0.09$)* and Control (6.6%; $p = 0.06$) did not reach statistical significance.

Bennell KL, Hinman RS, Matcalf BR, Buchbinder R, et al. Efficacy of physiotherapy management of knee joint osteoarthritis: a randomised, double blind, placebo controlled trial. *Ann Rheum Dis*. 2005;64:906-912. Doi: 10.1136/ard.2004.026526.

- PEDro Score 9/11. Level 1b evidence. RCT.
- 140 community volunteers with knee osteoarthritis participated and 119 completed the

trial.

- Physiotherapy and placebo interventions were applied by 10 physiotherapists in private practices for 12 weeks. Physiotherapy This included knee taping, exercises to retrain the quadriceps, hip, and back muscles*, balance exercises*, thoracic spine mobilization, and soft tissue massage followed by 12 weeks of self management. The control group received ultrasound and light application of a non-therapeutic gel, followed by no treatment.
- Secondary outcome included the step test: functional dynamic test of standing balance that includes recording the number of times the foot can be placed up onto a 15 cm step and then returned the floor in 15 seconds while balance on the symptomatic leg
- No *significant difference between groups* after 12 weeks and follow-up. *However, significant improvements on the Step Test were demonstrated in both groups at 12 weeks and the follow-up.*

Diracoglu D, Aydin R, Baskent A, Celik A. Effects of kinesthesia and balance exercises in knee osteoarthritis. *Journal of Clinical Rheumatology*. 2005;11(6):303-310. Doi: 10.1097/01.rhu.0000191213.37853.3d.

- PEDro score 7/11. Level 1b evidence. Quasi-random controlled trial.
- This 8-week study was conducted on 66 female patients with knee OA who were randomized into 2 groups. The first group received kinesthesia and balance exercises (such as retrowalking, walking on their toes, leaning to the sides, balance board exercises, mini trampoline exercises, plyometric exercises, and so on) in addition to strengthening exercises. The second group received only strengthening exercises.
- In both exercise groups, statistically significant improvements were obtained in WOMAC, SF-36 Forms, 10- meter walking time, 10 stairs climbing time, in isokinetic muscle strength measurements of the quadriceps muscle, and in proprioceptive sense measurement (ie, in all the parameters used in the investigation) at postexercise compared with preexercise.
- When *10 stairs climbing time and 10-m walking time were assessed, the kinesthesia group had statistically significantly lower values in both of these* 2 parameters compared with the strengthening group at postexercise