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## **Virtual Reality Exercise Effect on Physical Strength and Fatigue in Hemodialysis Patient : A Systematic Literature Review**

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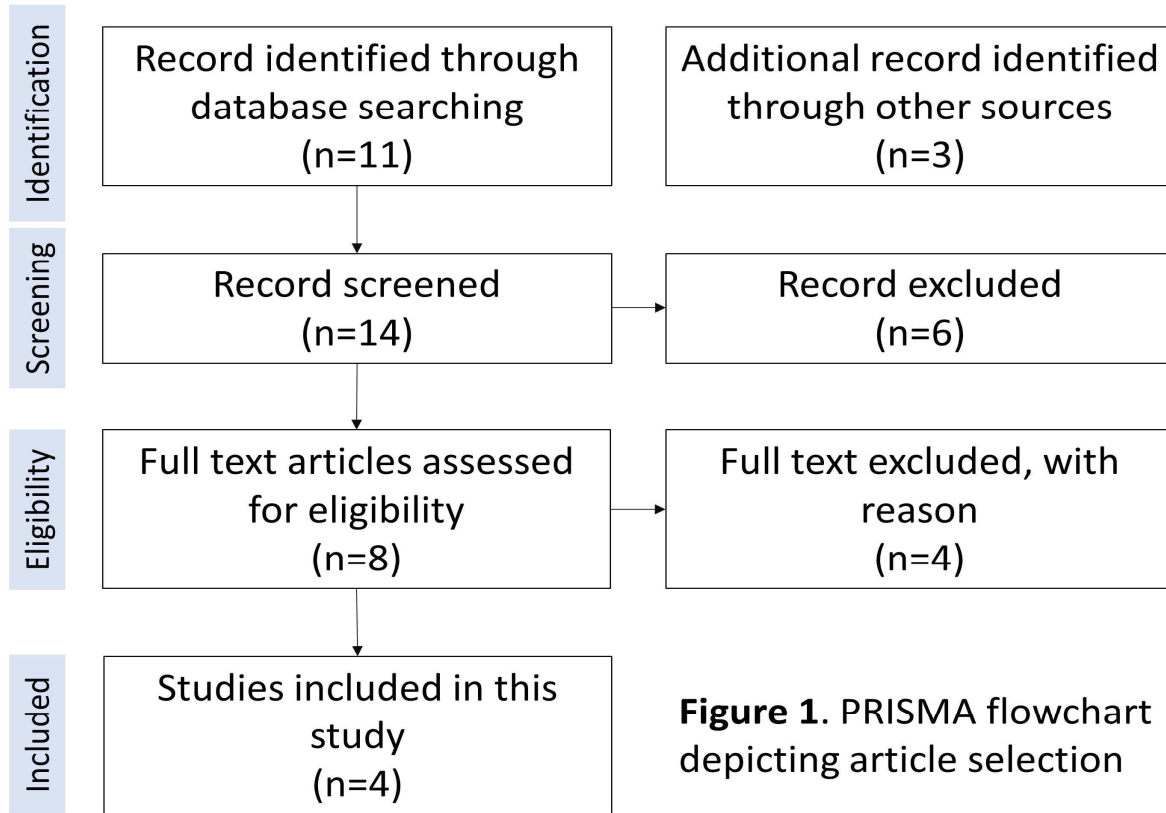
**Objectives:** Physical exercise during hemodialysis improve hemodialysis patient functional level. Tiredness, fear and lack of motivation to do repetitive routine discourage patient to reach its benefit. Virtual reality, as clinical intervention, already shown its capability to help diabetes and stroke patient to regain their physical strength due its immensity and convenience. This systematic review of the literature review aims to investigate the impact of virtual reality exercise on physical strength and fatigue in hemodialysis patient

**Methods:** PubMed, EBSCO, and Google Scholar were all used to search for control/ clinical trials demonstrating the effect of virtual reality exercise on physical strength and fatigue in hemodialysis patient.

**Results:** All studies showed improvement on physical strength in this population. VR exercise can also increase body composition, physical fitness, physical strength amd functional capacity. Also, one of the two studies showed significant decrease on fatigue level. There was limited supporting evidence to suggest that virtual reality exercise could reduce fatigue level.

**Conclusions:** based on findings, virtual reality exercise may improve physical strength, although more research needed to prove virtual reality effect on decreasing fatigue of hemodialysis patient. Virtual reality exercise can be an additional therapy for patient who undergoing hemodialysis.

Figure 1. PRISMA flowchart depicting article selection



**Figure 1.** PRISMA flowchart depicting article selection

Table 1. Characteristics of the RCTs used in this systematic review

| Author and Date          | Location | Study type                                     | Population (n) at end of study                | Virtual reality exercise  | Duration | Study Result   |
|--------------------------|----------|--|---|---|----------|--|
| Cho et al., 2014         | Korea    | Single-blind, randomized clinical trial        | n=24 experimental group<br>n=24 control group | Virtual reality exercise program (VREP) on Wii Fit Plus program applied 3 times a week, 40 minutes each time, for 8 weeks while waiting for dialyses turn.                                      | 8 week   | Physical fitness (back strength, leg strength and balance) and body composition (skeletal muscle mass, body fat rate, arm and leg muscle mass) significantly increased ( $p < 0.01$ ; leg strength $p < 0.05$ ), and the level of fatigue significantly decreased ( $p > 0.001$ ; leg muscle mass $p < 0.05$ ) in the exercise group. While no changes noted in control group. |
| Segura-Orti et al., 2019 | Spain    | double-blind, randomized clinical trial        | n=18 experimental group<br>n=18 control group | Strengthening and VR intervention using adapted version of ACT (A la Caza del Tesoro) was carried out during dialysis   | 20 weeks | sit-to-stand-to-sit tests 10 and 60, gait speed, one-leg heel-rise left leg, and the 6-minute walk test improved in the end of 20 weeks (STS 10 $p = 0.001$ ; gait speed $p < 0.001$ )<br>Other outcomes (sit-to-stand-to-sit test 60, gait speed, one-leg heel-rise test for the left leg, and 6-minute walking test) did not show changes due to error in the test           |
| Chou et al., 2018        | Taiwan   | Single blinded, randomized, quasi-experimental | n=32 experimental group<br>n=32 control group | Nintendo® Wii Fit game-based training with boxing, based on the standard Nintendo® Wii exercise guidelines, 3 times a week, for 30 min per session.   | 4 weeks  | Significantly lower posttest score for overall fatigue ( $t = 2.81, p = .009$ ), reduction in vigor and motivation ( $t = 2.88, p = .007$ ), and distress and loss of control in mood ( $t = 2.18, p = .037$ )   |
| Maynard et al., 2019     | Brazil   | Single-blind, randomized controlled study      | n=20 experimental group<br>n=20 control group | Wii Sports™ (2006) and Wii Fit™ Plus (2009) software Penguin slide, table tilt, tightrope tension, soccer heading, obstacle course, baseball bowling, tennis, jogging, step and island cycling) | 12 weeks | The exercise improved functional capacity (TUG: $P = 0.002$ , DAS1: $P < 0.001$ ) and HRQoL in physical and specific domains: physical functioning ( $P = 0.047$ ), role physical ( $P = 0.021$ ), as well as in physical composite summary ( $P < 0.001$ ) and effects of kidney disease ( $P = 0.013$ ). There was no influence on depressive symptoms ( $P = 0.154$ )       |