



Otago Exercise for Fall Prevention in Older Adults A Narrative Literature Review

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Abstract

Background: Falls threaten independence in older adults, highlighting the need for evidence based exercise interventions. **Objectives:** To examine evidence on the Otago Exercise Program (OEP) for improving balance, mobility, and fall prevention among older adults. **Methods:** A narrative literature review examined ten selected reports published between 2021 and 2025, identified through PubMed, ScienceDirect, and Google Scholar. Evidence was categorized by study design, distinguishing controlled studies, uncontrolled studies, a case report, and a trial protocol. Actual falls were analyzed separately from functional assessment outcomes. **Results:** Nine reports provided intervention outcomes, while one described a planned trial. Short studies generally reported improvements in balance or mobility, including a Berg Balance Scale increase from 37.36 to 48.73 in an uncontrolled study. A Spanish randomized trial comparing group and individual delivery found a 12 month difference in reported falls of -0.58 percentage points (90% confidence interval: -6.54 to 5.39). This comparison evaluated delivery formats rather than effectiveness against usual care. **Conclusions:** Individually adapted OEP may support fall prevention strategies, although evidence should be interpreted according to study design. Future implementation should monitor adherence, functional outcomes, actual falls, and adverse events.

Keywords: Otago Exercise Program; Older adults; Fall prevention; Balance; Functional mobility.

Introduction

Falls can cause injury, loss of independence, and greater care needs in older adults. The World Health Organization identifies older people as particularly vulnerable to serious fall related injury¹. Prevention therefore requires assessment of both the person and the environment, including mobility, medications, vision, footwear, and home hazards, as emphasized by the World Falls Guidelines².

Declining muscle strength and postural control provide a rationale for exercise based prevention. Lintin and Miranti describe changes in muscle mass and strength with aging³, while Karba and colleagues examine

the relationship between physical activity and cardiorespiratory fitness in older adults⁴. These Healthy Tadulako Journal contributions support attention to physical capacity, although neither establishes the effect of Otago exercise on fall incidence.

Maintaining function also matters to quality of life. Research in Lasoani examined fitness exercise and quality of life among older adults⁵, providing local context for community exercise services. International evidence supports exercise programs that challenge balance and functional ability in reducing falls among older people living in the community⁶. The clinical question is how this broader

evidence translates into an accessible and sustained program.

The Otago Exercise Program (OEP) combines progressive lower limb strengthening, balance exercises, and walking. Its components address physical contributors to instability, and published synthesis describes implementation in different settings⁷. Delivery varies between individual home practice, supervised sessions, and group formats. These variations may influence exercise progression, adherence, and the population able to participate.

The recent literature includes completed controlled studies, uncontrolled assessments, case reports, and protocols. Their endpoints also differ: a recorded fall is a clinical event, whereas the Berg Balance Scale (BBS) and Timed Up and Go (TUG) assess balance or functional mobility. This review examines ten selected reports to clarify what OEP evidence shows about these outcomes and to identify practical implications for nursing and community care.

Materials and Methods

Study Design

This narrative literature review evaluates OEP for fall prevention and related physical function in older adults. The review question is whether the selected reports show improvement in actual falls, balance, or mobility, and how design and delivery affect interpretation. The

narrative format permits critical discussion across different designs; transparent aims, referencing, scientific reasoning, and endpoint reporting follow the priorities described in SANRA⁸. The review is not presented as a registered systematic review or an exhaustive assessment of all eligible studies.

Sample

The core literature comprises ten reports published from 2021 to 2025 within the stated 2021 through 2026 publication window. These reports concern OEP in older adults and include controlled interventions, studies measuring change within one group, a single patient case report, and a trial protocol. Completed intervention reports contribute to the outcome synthesis; the protocol contributes only implementation context. Background reviews, reporting guidance, and HTJ articles are cited separately and are not counted as additional core reports.

A population, intervention, comparator, and outcome framework organizes the review question (Table 1). Comparators may be usual activity, another exercise program, another OEP delivery format, or baseline assessment in an uncontrolled study. Permitting baseline comparisons avoids imposing a control group requirement on studies that do not have one. Such studies are interpreted separately from comparative trials.

Table 1. Framework for the narrative review

Component	Scope and search concepts
Population	Older adults in community or residential care; older adults, elderly, aged, lansia
Intervention	Otago Exercise Program or Otago Home Exercise Programme
Comparator	Usual activity, alternative exercise, alternative OEP delivery, or baseline assessment; no comparator for a descriptive protocol
Outcomes	Recorded falls, fall risk categories, balance, functional mobility, strength, fear of falling, adherence, and adverse events

Data Collection Technique

Literature identification used PubMed, ScienceDirect, and Google Scholar, with concepts concerning older adults, Otago exercise, and falls or fall risk. English and Indonesian reports are represented. The framework in Table 1 defines the search concepts and review scope; it is not a record of identical database specific search syntax. Report characteristics were organized by setting, design, sample, intervention, comparator, follow up, and outcome.

Publication status and study design were checked against the retrieved reports. A planned trial was distinguished from a completed trial, and planned sample size was distinguished from randomized and analyzed participants. In keeping with PRISMA 2020 terminology, search records, reports, and studies are separate units⁹. Figure 1 therefore maps the ten selected reports by evidence type rather than presenting database screening counts as a validated PRISMA flow.

Data Analysis Technique

Narrative synthesis groups completed studies by controlled or uncontrolled design and separates actual falls from functional test outcomes. This grouping reflects SWiM principles for transparent synthesis without meta analysis¹⁰. No pooled effect, combined p value, or vote counting by statistical significance was calculated. Numerical outcomes retain their units and denominators. A reported p value of 0.000 is expressed as $p < 0.001$; differences between delivery formats are not interpreted as efficacy against usual care.

Critical interpretation considers randomization and allocation reporting, availability of a comparator, missing outcome data, outcome measurement, and selective reporting, drawing on the domains emphasized by RoB 2¹¹ and the design specific JBI appraisal tools¹². Table 3 states concrete design

and reporting concerns rather than assigning an unsupported numerical quality score or a formal certainty category. Lack of an adverse event statement is not interpreted as absence of harm.

Ethical Consideration

This review analyzes published literature and involves no recruitment, intervention, or access to identifiable participant records. The authors credit the original sources and report their findings at an aggregate level. No participant consent or ethics approval from an individual included study is represented as approval for the present review.

Result

The unit of analysis is a published report, rather than newly recruited respondents. The ten core reports comprise Pitaloka and colleagues¹³, Ariyanti and colleagues¹⁴, Lucya and colleagues¹⁵, Mutnawasitoh and colleagues¹⁶, Lestari and colleagues¹⁷, Waters and colleagues¹⁸, Albornos Muñoz and colleagues¹⁹, Sajitha and colleagues²⁰, Mugilan and colleagues²¹, and Bharath and colleagues²². Each appears once in the study characteristics table (Table 2) and once in the corresponding outcome and appraisal table (Table 3).

Nine reports contain intervention outcomes. The Waters report describes a planned randomized trial in Zuni elders and is retained as a protocol, without attributing a fall reduction to its participants. The largest completed report is the Spanish trial: 728 was the target sample, 827 participants were randomized, and 498 completed 12 months. These denominators describe different stages and are not interchangeable.

Settings include Indonesian community and residential services, Indian community and residential care, Spanish primary care, and a planned tribal community trial in the United States. Most completed reports measured BBS,

TUG, or other functional tests. The Spanish trial assessed reported falls over 12 months. Table 2 summarizes delivery and follow up;

Table 3 separates numerical findings from appraisal and safety reporting.

Table 2. Characteristics of the ten selected reports

Report and setting	Design and sample	OEP delivery and dose	Comparator and follow up
Pitaloka et al, 2023 ¹³ ; Tegalrejo, Indonesia	One group assessment before and after intervention; 102 older adults	Three sessions weekly for four weeks; 35 minutes per session; 12 sessions	Baseline assessment; after the program
Ariyanti et al, 2025 ¹⁴ ; Jagoi, Indonesia	One group assessment before and after intervention; 42 adults aged 60 to 79	Three sessions weekly for four weeks; intensity not specified	Baseline assessment; four weeks
Lucya et al, 2025 ¹⁵ ; community care, Bandung, Indonesia	Two group quasi experimental study; 60 participants, 30 per group	Three sessions weekly for three weeks; 30 minutes per session	Morning walk education without structured exercise; three weeks
Mutnawasitoh et al, 2021 ¹⁶ ; residential care, Surakarta, Indonesia	One group study; results describe 17 participants; methods text mentions 31	At least three sessions weekly for four weeks; 30 minutes; leg loads 0.5 to 1 kg	Baseline assessment; four weeks
Lestari et al, 2024 ¹⁷ ; Batara Hati Mulia Foundation, Gowa, Indonesia	One group assessment before and after intervention; 30 older adults	Home exercise; dose and progression not specified in the available extraction	Baseline assessment; interval not specified
Waters et al, 2022 ¹⁸ ; Zuni community, United States	Randomized trial protocol; planned enrollment 200	Culturally adapted OEP; planned implementation	Falls prevention education; planned follow up, no completed results
Albornos Muñoz et al, 2024 ¹⁹ ; 21 primary care centers, Spain	Randomized comparison of delivery formats; 827 randomized; 498 completed 12 months	Nurse delivered OEP; five face to face sessions, reinforcement at six months, home practice	Group versus individual OEP; assessments at six and 12 months
Sajitha et al, 2022 ²⁰ ; residential care, Kerala, India	Controlled study reporting random allocation; 30 participants, 15 per group	Three sessions weekly for six weeks; warm up 5 to 10 minutes, strength training 30 to 40 minutes, cool down 5 to 10 minutes	Usual activity without training; six weeks
Mugilan et al, 2025 ²¹ ; Anandhapuram, India	Two group experimental report describing random allocation; 30 participants, 15 per group	Two sessions weekly for six weeks; approximately one hour per session	General mobility and balance exercise; six weeks
Bharath et al, 2025 ²² ; India	Case report; one woman; age given as 72 in abstract and 75 in case narrative	Three sessions weekly for six weeks; 30 minutes per session	Baseline assessment; six weeks

OEP, Otago Exercise Program. Dose refers to the schedule reported for the individual study; unspecified details are not replaced with a generic Otago prescription. The publication year for Ariyanti follows the journal issue and DOI record; its PDF header carries a different year.

Table 3. Outcomes and critical appraisal of the ten selected reports

Report and instrument	Reported result	Design and reporting appraisal	Adverse events
Pitaloka; BBS risk categories	Low risk 18.6% to 83.3%; moderate 74.5% to 14.7%; high 6.9% to 2.0%; $p < 0.001$	Uncontrolled change; comparison cannot distinguish exercise effects from other changes over time	Not documented in the available extraction
Ariyanti; TUG risk categories	High risk: 57.1% to 33.3%; low risk: 42.9% to 66.7%; $p < 0.001$	Uncontrolled category shift; does not quantify actual fall incidence	Not documented in the available extraction
Lucya; TUG risk categories	Intervention group: high risk 10% to 0%; moderate 90% to 80%; low 0% to 20%; $p < 0.001$	Nonrandomized comparison; control table contains percentage errors; no reliable between group effect estimate with confidence interval	Not documented in the available extraction
Mutnawasitoh; TUG	Within group Wilcoxon $p = 0.025$; magnitude of change not reported in this extraction	Uncontrolled design; sample discrepancy between methods and results precludes a reliable combined participant total	Not documented in the available extraction
Lestari; BBS	Mean score 37.36 before and 48.73 after intervention; difference 11.37 points	Uncontrolled observed improvement; no comparative estimate or confidence interval	Not documented in the available extraction
Waters; planned falls and functional measures	No completed intervention outcome in this protocol	Protocol contributes implementation context; no treatment effect or outcome risk of bias rating	No completed safety findings
Albornos Muñoz; reported falls	At 12 months, difference -0.58 percentage points; 90% CI -6.54 to 5.39 ; within the prespecified 10% equivalence margin	Active format comparison; 498 of 827 randomized completed follow up, requiring attention to attrition	Comprehensive safety inference is not made from the extracted outcome summary
Sajitha; BBS, fall efficacy, chair stand	BBS: OEP 38.73 to 42.40; control 37.60 to 37.46	Small controlled study; randomization procedure and assessor masking insufficiently detailed for a low bias judgment	Not documented in the available extraction
Mugilan; BOOMER, TUG, FRT, Step Test, SSEC	Reported BOOMER/TUG component: OEP 2.40 ± 0.80 to 3.33 ± 0.69 ; control 2.13 ± 0.88 to 2.33 ± 0.86 ; units unspecified	Small controlled study; allocation and scale reporting require scrutiny. Step Test $t = 1.4$ and $p < 0.0001$ are inconsistent	Not documented in the available extraction
Bharath; TUG	TUG 13.8 to 11.2 seconds after six weeks; observed reduction 2.6 seconds	Case observation; inconsistent age reporting; no comparative effect estimate	Not documented in the available extraction

BBS, Berg Balance Scale; TUG, Timed Up and Go; CI, confidence interval; FRT, Functional Reach Test; SSEC, Single Stance Eyes Closed. Appraisal entries identify supported concerns and are not completed RoB 2 or JBI checklist ratings. A blank safety record does not establish that no adverse events occurred.

The Spanish trial directly tests whether group and individual OEP delivery produce comparable falls outcomes. Its 12 month

difference and 90% confidence interval fall within the prespecified equivalence margin. Because both arms received OEP, the

comparison does not estimate the benefit over usual care. Individual delivery had higher exercise adherence scores, supporting attention to how the program is delivered rather than treating all formats as identical.

The smaller controlled studies report changes in functional outcomes, with concerns about sample size and reporting detail. The Sajitha report provides BBS values for both groups, allowing readers to compare their observed trajectories. The Mugilan report supports examination of functional outcomes but its inconsistent Step Test statistic is not carried forward as a verified effect estimate. Uncontrolled studies show temporal

improvement in test scores or risk categories, which remains distinct from comparative efficacy or fewer recorded falls.

Figure 1 organizes the ten reports into nine reports with intervention outcomes and one protocol. Outcome reports are further divided into four controlled reports, four uncontrolled reports, and one case report. The controlled category includes three reports describing random allocation and one quasi experimental report. The diagram describes evidence composition and does not depict database screening or establish completeness of literature identification.

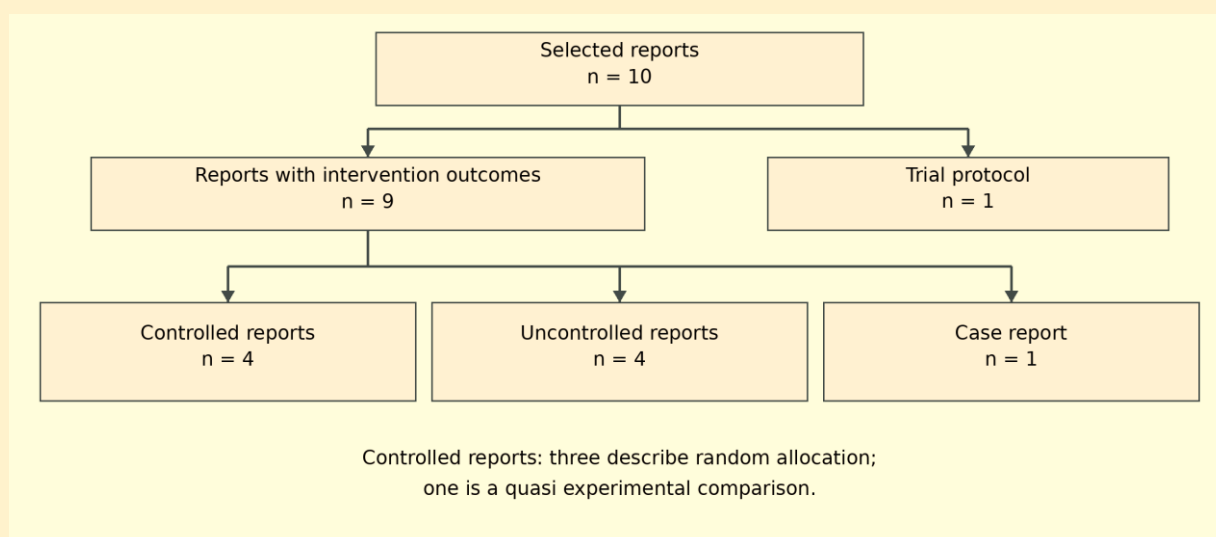


Figure 1. Evidence classification of the ten selected reports. The Waters protocol contributes implementation context and is excluded from outcome conclusions. Classification concerns reports rather than a pooled participant population.

The selected evidence most clearly describes improvement in balance or mobility and practical variation in OEP delivery. One large active comparison addresses actual falls and supports comparable group and individual formats within its equivalence margin. The smaller functional studies provide complementary evidence, with controlled and uncontrolled findings interpreted separately. No overall fall reduction percentage or pooled

safety conclusion is derived from these ten reports.

Discussion

Interpretation of Key Findings. OEP targets clinically relevant physical functions, and improvements in BBS or TUG are useful when assessing progress. These measures do not replace prospective fall recording. The strongest information about delivery comes from the Spanish trial, where comparable falls

outcomes accompanied different adherence scores. The result supports considering both access and sustained participation when selecting a format, while recognizing the loss of participants during follow up.

The uncontrolled reports add information about implementation in Indonesian settings. Ariyanti describes a four week schedule, while Lestari reports a substantial observed BBS increase. Such findings help identify feasible local delivery options and outcomes worth monitoring. Their design does not isolate the exercise contribution from repeated testing, concurrent care, or changes in activity outside the program. A statistically significant within group result therefore supports functional change without supplying a comparative risk reduction.

Comparison with Previous Studies. The findings are compatible with broader evidence supporting balance and functional exercise for community fall prevention⁶ and with the OEP literature summarized by Yang and colleagues⁷. An additional randomized trial by Genç and Bilgili found improvements in balance and functional mobility but did not improve all outcomes, including fear of falling²³. This external study provides context and is not added to the ten report core set. Its mixed endpoints reinforce the need to distinguish physical performance, confidence, and actual falls.

HTJ publications contribute complementary physiological and local context. Putra and colleagues studied balance and coordination after physiotherapy exercise²⁴, supporting assessment of neuromuscular function without establishing OEP efficacy in older adults. Widiatmika and colleagues examined skipping exercise and aerobic capacity in male volleyball players²⁵, while Pakaya and Herman compared aerobic and anaerobic activity in relation to HDL²⁶. These latter studies illustrate that exercise

adaptations depend on the training target and population; they do not justify prescribing skipping to frail older adults or inferring fewer falls from changes in fitness or lipids.

Clinical and Public Health Implications. Community services can use OEP within individualized fall prevention, with initial assessment, instruction, progressive challenge, and reassessment. Group sessions may improve access where travel and staffing permit, while individual home delivery can be appropriate for people who need tailored progression. The Spanish primary care experience supports nurse involvement, but the intensity of oversight should reflect physical ability, cognition, and the capacity to practice safely. These implementation recommendations align with the broader World Falls Guidelines².

Adherence should be recorded as completed exercise relative to the prescribed schedule, with reasons for missed sessions discussed at follow up. Short programs provide information about early physical change; maintaining participation over months requires reinforcement and adjustment. The Zuni protocol illustrates cultural adaptation and the planned comparison with education, but its proposed intervention is not a completed effectiveness result. Community application should therefore combine locally acceptable delivery with prospective measurement of both functional outcomes and falls.

For frail people or those with common comorbidities, the starting exercises and degree of supervision should follow clinical assessment. The small residential studies do not establish effectiveness across all levels of frailty: for example, the Mutnawasitoh report excluded several chronic conditions and use of assistive devices. Medication effects, cardiovascular symptoms, painful joints, visual impairment, and environmental hazards require concurrent attention. Recording pain, exercise related symptoms, near falls, and injuries is

essential because favorable functional outcomes alone do not establish safety.

Advantages and Limitations of the Research. This review brings Indonesian implementation reports into discussion with controlled international evidence and explicitly separates actual falls, functional endpoints, and a protocol. Its narrative selection does not establish exhaustive coverage. Designs, intervention schedules, instruments, and follow up periods differ, and some reports contain incomplete or inconsistent numerical information. The critical appraisal identifies these concerns without assigning formal certainty grades or unsupported low bias labels. The review consequently offers a clinically organized interpretation rather than a pooled estimate of OEP efficacy.

Recommendations for Future Research. Future comparative studies should prespecify the exercise schedule, progression, comparator, fall definition, and adverse event monitoring. Falls should be recorded prospectively over adequate follow up, alongside functional measures, adherence, and withdrawals. Studies should report effect estimates with confidence intervals and describe randomization, assessor masking, and missing data. A subsequent systematic review should use a dated database specific search, documented duplicate removal, independent screening, complete exclusion reasons, and formal design appropriate appraisal^{9,11,12}.

Conclusion

The selected literature supports OEP as an option for improving balance and functional mobility within individualized fall prevention for older adults. A large trial supports comparable group and individual delivery for reported falls within a prespecified equivalence margin. Shorter and uncontrolled studies provide supportive functional observations, while the protocol supplies no completed effectiveness result. Practice should combine suitable exercise progression with adherence

support and monitoring of actual falls and adverse events.

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Conflict of Interest Statement

The author(s) declare no commercial, financial, or personal conflicts of interest related to this research. All authors approved the final manuscript and consented to its publication in *Healthy Tadulako Journal*.

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