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Osteoarthritis Falls, Origins, Implications, Needs, and Solutions: 2020-2025

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Author Details

*Ray Marks**

Research, Osteoarthritis Research Center, Box 5B, Thornhill, ONT L3T 5H3, Canada

*Corresponding author

Dr Ray Marks, OARC Clinical Research and Education Director, Ontario L3T 5H3, Canada, Tel: +1-647-968-2725, Email: Dr. RayMarks@osteoarthritisresearchcenter.com, doctorraymarks75@gmail.com

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Abstract

Lower limb osteoarthritis, a strong age related chronic condition, is often accompanied by an increased tendency to fall and sustain various degrees of injury. The disease alone can in turn induce a high falls risk and cycle of recurrent falls and heightened disability. This report updates what is known about falls in the context of disabling osteoarthritis and where more emphasis could be placed in this regard. Using the PUBMED data base and others, clinical studies published largely between January 1, 2020 and December 31, 2025 concerning possible falls and lower limb osteoarthritis linkages were sought. The search results revealed a growing interest in this topic and that osteoarthritis can lead to the chances of incurring one or more falls and further health and disability challenges, while falling can provoke the onset of osteoarthritis in its own right Although confusing or overwhelming, proprioception issues not well studied to date merit exploration in our view as does yoga an exercise approach that appears to improve coordination, mental health, and flexibility in elderly subjects and others.

Keywords: Falls, Fall Injuries, Older Adults, Osteoarthritis, Pain, Prevention, Treatment, Yoga

Background

Osteoarthritis, a progressively disabling disease commonly affects one or more joints such as the hip and knee joints of older adult population, a group prone to falling [1-4]. At the same time, a wealth of data attests to many possible reasons for this, such as the presence of pain, possible muscle mass losses, ligament instability, obesity and muscle fat mass increases, poor proprioception and balance, diabetes, and cardiovascular diseases, but with no unifying consensus in this regard [5-7].

Adding to the confusion are other related data that reveal a possible role for depression, the lack of adequate sleep, and possible medications that can heighten the risk of an older adult with without osteoarthritis for falls [7] along with neurological disease correlates, such as impaired joint sense [8].

In the face of the numbers of aging adults worldwide suffering and expected to suffer from lower limb osteoarthritis by 2050 and knowledge that the presence of joint instability and pain may well increase falls risk in this group, even if these conditions are somewhat remediable [9,10] more urgent attention to averting an immense health burden appears indicated. Moreover, although falls and fractures after total hip replacement surgery alone remain under recognized, their clinical importance in the realm of complications should not be ignored [5]. Acknowledging the importance of averting falls and identifying predictive preoperative factors such as knee extensor strength and gait speed, along with discrepancies between postoperative balance confidence and fall history may provide a high degree of actionable insights for risk stratification and fall-prevention strategies in clinical practice

However, whether mitigation should focus on a possible suboptimal relationship between desirable spinal proprioceptive input patterns and alterations in neuromuscular control strategies that potentially impair gait control, or whether obesity induces joint instability and excess pain and muscle fat mass that impairs muscle reactively or the presence of cardiovascular disease, unsafe medication usage and type of medications affect falling is difficult to pinpoint [7,10,11].

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Key Research Questions

In this review we sought to examine

If there is currently agreement on osteoarthritis associated falls risk factors a major pathogenic factor that could be harnessed towards more effective falls prevention and osteoarthritis mitigation efforts.

Whether the association between falls and osteoarthritis is a uni- or bidirectional one in selected cases. If so, we sought to ascertain if linkages exist and if any are amenable to prevention or intervention.

Since falls associated with osteoarthritis can magnify or induce a life time of suffering, as well as significant health costs even in the face of surgery [8] we sought to establish if there are specific preventive strategies indicated for community dwellers who wish to age 'in place' or whether some might actively avoid the prevention idea because they perceive this as ageist and/or 'stigmatizing or because they have a fear of falling.

Rationale

Falls in the elderly are said to be attributable to a host of intrinsic factors such as:

Altered gait patterns

Blood pressure problems

Cognitive issues

Diabetes

Dizziness

Drug usage

Frailty

Muscle mass losses

Nutrition deficits

Pain

Peripheral neuropathy

Poor balance

Reduced proprioception

Visual deficits

The presence of osteoarthritis specific factors that can overlap with any above mentioned factor to raise a risk for injurious falls and their damaging impacts on mobility, and independence in the case of the lower limb include.

Anxiety and fear

Depression

Pain

Joint stiffness and inflammation

Joint movement limitations

Muscle weakness and pathology

Ligament or capsule laxity

Limited walking endurance

Slow walking speed

Poor dynamic balance control

Joint locking and meniscus tears

Faulty posture and deficient proprioception

Sleep deprivation

Since outcomes for knee osteoarthritis sufferers' alone who incur a falls event are found to be significantly worse over time than those outcomes of cases who do not fall, and surgery to replace a diseased end stage knee joint does not always prevent falls post surgery, it appears a better understanding of what specific variables might underpin this cycle of unwanted events is highly desirable [12]. Moreover, since falling, as well as excess pain and disability are not only paramount falls indicators, but can- if serious- lead to premature mortality and morbidity – it appears it may be beneficial to examine this topic in detail to ascertain if there is a consistent interactive linkage between the onset and progression of disabling osteoarthritis in the older population and certain variables that can arguably lead to and be exacerbated by falls injuries.

In formulating the present report, we limited this to recent plus new data believed to address the key questions posed in this mini review. To this end, we largely extracted PUBMED electronic data base information using the key terms: "osteoarthritis and falls", "osteoarthritis and falls risk/injury" as listed and catalogued from January, 1 2020-December 31, 2025. As well, the PubMed Central, and Google Scholar data bases were reviewed. Accepted were articles published in the English language as full reports and pertinent to the current theme, with the exception of falls relative to older adults in general, those with specific health challenges other than osteoarthritis, laboratory studies, and/or studies on total joint replacement surgery, intervention studies and articles that did not discuss osteoarthritis per se, for example those that discussed the perception of possible falls, the fear of falling, or falls self-efficacy, but not osteoarthritis. Data were carefully reviewed by the author-an osteoarthritis expert- for relevance and those articles deemed potentially informative in the author's view were downloaded and analyzed. PUBMED was selected as the key electronic data source of information given its widespread data repository and effective method of organizing recent as well as relevant data.

Results

As of December 31, 2025, a scan of the current data shows osteoarthritis remains a topic of immense interest to researchers and its association with falls studied intermittently since 1987 continues more intently than not. Although limited numerically when compared to other clinical themes, most current studies focusing on osteoarthritis and falls uniformly acknowledge this association is one of high importance to clarify more specifically, as well as one likely amenable to a variety of remediable efforts [13-18]. However, concepts such as 'the fallers concern level', along with their possible deficient walking stability, dynamic balance, and slow walking speed may not be obviated readily without due analyses and planning [13].

Unfortunately, despite years of study, a closer examination reveals most recent as well as past studies remain largely atheoretical and assume certain variables are salient falls mediators without any due validation. Generalizability of the data is also limited because almost all studies that prevail focus on the osteoarthritis knee joint, even though ankle, hip, spine, and even shoulder osteoarthritis may disturb gait control that leads to a high falls risk. Within the knee osteoarthritis data reports alone, most exhibit diverse conclusions, test differing research questions, and fail to conduct uniform assessment approaches. Moreover, most studies appear to focus on one or more assumed 'physical' falls risk factors, while far fewer place any emphasis on deficits in cognition, psychological status, and factors such as anxiety and a lack of vitality [14].

Rosado et al. [8] point out however, that cases with higher degrees of dysfunction or other related osteoarthritis symptoms, such as a persistent fear of falls, low back pain, diabetes mellitus, and an increased body mass index may be risk. As well, Rosadi et al. [8] did feel their study showed that knee proprioception and joint range of motion are potential noteworthy falls risk factors in the context of knee osteoarthritis as these tentatively serve as protective factors against falls when intact. Other mediating or moderating factors include pain and pro-

gressive knee joint damage and increasing instability [19,21].

According to Iijima et al. [22] who examined cases with sarcopenic knee osteoarthritis, those with both these attributes tended to have a 4.17 times higher odds of incurring two or more falls than controls after adjustment for age, sex, and body mass index. Although the increased recurrent falls experience was not clearly confirmed in participants with isolated sarcopenia and knee osteoarthritis, a loss of muscle mass is likely to have an impact on balance and timely reflex response ability, especially if replaced by fat mass. However, results of falls over time may vary depending on what is assessed or not assessed in our view. For example, in their study, van Schoor et al. [23] who observed Individuals with clinical knee osteoarthritis to be at an increased risk for recurrent falls argued this was likely mediated by pain medication, particularly the use of opioids.

Other studies show that having a falls risk appears to be more likely in cases experiencing challenges in carrying out dual tasks when walking or trying to balance [24-26] or specific features of any altered gait and gaze behaviors deemed falls determinants [27]. Additional findings [4] imply a further falls role for high levels of back pain, and a reduced walk distance capacity. Others imply falls risk is increased in osteoarthritis older women found to have cognitive symptoms of anxiety and excess stress [28] although others imply muscle weakness and early pathological changes in the neuromuscular system are the most salient risk factors [13].

Others imply older adults with radiographic evidence of osteoarthritis who may tend to have an increased likelihood of experiencing recurrent falls may do so because they have decreased mobility, and use opioids or paracetamol to control pain [23,29-33]. They may also exhibit repeated falls especially if they are experiencing pain [32] plus abnormal gait cycle mechanics and proprioception [13,15,34] depression and/or exhibit a fear of falling [31,35,36] and the presence of concurrent back and hip pain [37]. Moreover the combined role of physical as well as psychological correlates may be implicated [7,19].

In addition, impaired balance, muscle weakness, the presence of one or more comorbidities, and increasing number of symptomatic joints are potential falls risk factors [18] associated with osteoarthritis. As well, disease severity or grade of disease is another possibly highly salient falls predictor in addition to stability and balance dysfunction and level of pain [38].

It is also increasingly apparent personal factors are likely to impact falls risk as may environmental factors, but these are often not studied in this regard in tandem [39]. Another view is that compared with older disease free adults, those with osteoarthritis may exhibit a significantly reduced step length, as well as gait speed, and subnormal vertical ground reaction forces in both normal walking as well as in the first recovery step following a backward slip perturbation. As well, their inadequate joint flexion and extension angles and generation of joint moments could predispose the older adult with osteoarthritis to injurious falls [40].

This possible aforementioned scenario may well reflect the convergence of multiple disease-related osteoarthritis influences on bipedal postural control during activities of daily living that require attention, but in what order and to what degree each is a salient determinant is unknown [41]. In this regard, it does appear disease associated muscle force declines as well as nerve associated pathway attrition can adversely affect gait and balance control, safe adaptive walking, plus associated reflex responsiveness [42-44].

Additional findings show falls in end stage knee osteoarthritis may be due however to low back pain coupled with a limited walking endurance [4,37]. Moreover, knee osteoarthritis may be an independent risk factor for falls in its own right [2] but this may depend on the circumstances in which the older adult falls, as well as their cognitive state [45].

In short, over time, the literature and data cited and others above have revealed many variables may explain falls risk or predict the nature of the osteoarthritis-falls linkage, but all are hard to unify and unravel readily in our view. In addition, in the absence of careful sub studies, the general exclusion of high age adults with severe osteoarthritis from many studies, as well as a failure to examine the role of multiple affected joints, osteoarthritis severity and pain, muscle force capacity, and timing, as well as balance, their relevance as salient widespread risk factors is uncertain. As well, walking ability, pain, nutrition, and medication intake impacts that appear of key import are challenging to verify or weight [46-53]. Moreover, both within individuals diagnosed with osteoarthritis many diverse perspectives rather than uniform attributes are likely to prevail, but are not studied in depth, as are joints other than those at the knee. Largely based on retrospective data or observational study, osteoarthritis-falls trajectories are also rarely studied prospectively to any degree over time, despite a possible informative need in the realm of prevention and intervention. A potential association between the presence of fatty muscle infiltration and falls in female cases who underwent total hip joint replacement also indicated a role for obesity as a falls risk factor, but this attribute is rarely studied in association with falls risk and outcomes [54,55]. Other identified falls risk factors-such as the implied role of advancing age, having a lower than desirable body mass index, heart disease, vision alterations, and a history of narcotics use, gait disturbances, and depression are also hard to unravel in the absence of sound data from sizeable representative samples [56-60].

At present though, many studies omit cases with mental health issues or those adults of higher ages with severe joint disease. It is hence unclear as to their relative importance and implications. To assess whether these attributes should be treated at all, and if so, separately in their own right or not, more inclusive robust prospective study designs, advanced measurement approaches, and computational models may enable more certainty in the results and their possible clinical significance relative to the presence of muscle weakness, poor co-ordination and balance, low activity levels and endurance capacity, and common health challenges that raise falls risk, such as deficits in gait control, plus pain extent [13,24,37,52,57].

In the interim, it appears safe to say that lower limb osteoarthritis, an important contributor to falling in its own right may be causing excess suffering via its falls associations even among healthy older adults and is especially relevant to mitigate and avert given its impact on recurrent falls and disability extent. Yet, current public health guidelines for protecting older adults health status may clearly be unable to selectively counter or address those health conditions such as osteoarthritis that are highly prevalent among older adults and that can raise their falls risk and reduce their injury threshold, such as diabetes, sedentary behaviors, multiple medication usage, muscle mass and bone mass declines. At the same time, generic or blanket recommendations to be active may be confusing for a frail older adult with limited abilities to interpret especially if they are in constant pain and lack balance control and this may well evoke anxiety and fears of exercising, rather than encouraging these or add to their falls risk.

Moreover, expecting an older at risk adults with mild cognitive impairments, visual challenges, severe depression and anxiety, fears of falling and/or one or more physical impairments to be able to examine or implement standard exercise regimens or pursue virtual games that are designed to improve balance in the absence of professional input and directives may in fact induce rather than prevent an injury in our view. Even in the presence of a compassionate caregiver, the individual must be sufficiently informed in this respect.

Similarly, although modified yoga appears a viable alternative to traditional exercises, asking house bound older adults to follow video or remote program focusing on challenging balance and coordination exercises may fail to allay anxiety or foster fall self-efficacy. By contrast, careful personalized subjective and objective evaluations, education as indicated to convey falls related risk issues and their solutions,

including their seriousness and severity along with periodic follow ups that reinforce encouraging messages and cues to action may be helpful. Efforts to minimize anxiety and stressful exercises in this regard, for example by yoga interventions, are potentially of special import in efforts to avert falls and possible falls risk and disordered sleep patterns.

Discussion

Osteoarthritis, a progressively disabling joint disease and one increasing in prevalence despite years of study is a costly health concern that reduces independence among many older adults in all parts of the world. At the same time, the prevalence of falls among older populations and that can be attributed in part to osteoarthritis disease features is an understudied topic even though it may have a bearing on the disease progression as well as its costs [42]. Moreover, when studied the key importance of identifying remediable disease outcomes and pathogenic factors remains confusing to apply uniformly even though most current authors support the view that falls are inextricably linked to osteoarthritis of the knee joint among other determinants and that more should be done to revert this link. This may be because few groups have sought to examine if falls, a major health determinant of the elderly in its own right, can lead to the onset of knee or other forms of osteoarthritis, a hypothesis that cannot be ruled out. Moreover, even if it appears those with more severe disease may fall to the same degree as those with less joint damage, this appears mostly true for radiological not the clinical disease features.

At the same time, even when the data sources examined in cumulative reviews are known to be reputable, and give the impression that they house a reasonable number of relevant papers on the present topic of interest, most do not appear to be based on any sound theoretical framework and thus a high number either examine many possible falls osteoarthritis correlates simultaneously, while others only examine a small number. Some data drawn from specific data repositories and not others, and analyses that employ secondary data sets captured in the previous decade using surveys and medical charts, may not represent the entirety of the situation as this occurs globally in 2025 and only knee osteoarthritis seems to have been studied to any degree across time.

Moreover, how the issues of osteoarthritis and falls interact is however rarely studied prospectively in non surgical contexts as opposed to those detailing post surgical knee or hip osteoarthritis follow up studies and falls occurrences. At the same time, what is being measured specifically is unclear as the terms applied for both knee osteoarthritis as well as falls, falling, and recurrent falls are not uniformly defined or employed in a standardized way across available studies. As well, a high number of studies continue to rely on subjective reports and measures that could be flawed, for example estimating the frequency of falls incidents as recounted by the faller who must rely on memory.

The possible confounding factors of differing osteoarthritis phenotypes, types of falls, falls location, disease duration, and extent, plus the role of prior surgery, overall health status, corticosteroid injections and others is also a profound limitation to progress in this realm in our view. As well, no current trend has emerged that would advance this field that currently omits a wide age range of study subjects, with limited stratification attempts to group key cohorts selected for study at baseline.

Hence even if can predict with reasonable certainty that some older adults with knee osteoarthritis may be more prone to falling or falls than healthy age-matched adults, this idea is not universally supported or possible to contest or validate. On the contrary, it has been possible to argue that that osteoarthritis may actually be protective against falls and related fractures, especially if it is severe and induces less rather than more weight bearing activities. However, if this is so, it is unclear how poor grip strength on the affected side appears to raise the risk for falling in knee osteoarthritis cases [46] or why joint replacement surgery does not obviate falls risk entirely [14]. There is also evidence that a persistent preoccupation related to an incident fall, a term also called 'fear of falling' by some authors, is of interest in the broad fields of geriatrics and gerontology because it is related to the risk of falling and subsequent morbidity of falling among elderly falls incident survivors [36].

However, even if it is accepted that this present report is a limited one, and the quality of the reported assessments cannot be readily discerned, this topic yielded the same vague outcomes co, emted on as long ago as 1998 [61]. As at that time, what the weightings of the possible role of balance, muscle strength, and proprioception and other factors play in explaining the prevailing falls risk and outcomes among older age osteoarthritis cases as well as the vulnerable older adult, remains to be studied more carefully and comprehensively to allow for salient clinically relevant patterns to emerge in our estimation. Moreover, the role of comorbid health conditions, gender, and age category, plus gait challenges, and obesity are clearly relevant, but the relative magnitude of these factors in the context of prevention and intervention options is currently unclear [9].

It is also apparent that some data may be erroneous, inaccurate, unrecognized, underreported or exaggerated by the immense reliance on self-reports, along with the frequent exclusion of osteoarthritis cases other than the knee and who might be cognitively challenged or at high risk for falls due to vision problems or heart disease. Additionally, efforts to examine the precise role of potentially modifiable risk factors not highlighted in the literature, such as diabetic neuropathy, joint inflammation, assistive device use, footwear, sedatives, sleep issues, frailty, fatigue, social factors, unsafe environments, and erroneous health beliefs about falling may prove insightful as may a focus on nutritional factors [62]. At the same time, efforts to differentiate static from dynamic balance underpinnings, which has not been studied to any degree in any osteoarthritis population, and its possible falls risk and injury linkage warrant study among samples of cases with well-defined and clearly established clinical and radiological osteoarthritis of varied joints, as well as in the case of differential disease sub groups.

Research Implications

To advance this line of inquiry it is evident more comprehensive theory based insights are required including broadening our understandings of the falls risk linkages between:

Nutritional, cognitive, and general health status factors [44,47,62].

Medication intake, environmental, and sleep factors [11].

Specific osteoarthritis correlates, such as pain, joint instability, poor dynamic balance during gait, poor proprioceptive sensitivity, muscle fatigue, contractures, muscle weakness [48] and atrophy, plus falls fears, falls self-efficacy [38,41,46-50,63] and obesity [9].

To this end, we specifically advocate for efforts that can more clearly differentiate high from low falls risk individuals using samples that match the median age of most osteoarthritis cases and who have either distinctive unilateral versus bilateral or multi joint disease. The development and validation of practical cost-effective reliable personalized screening tools, including those that can capture falls history accurately are paramount as well [51]. Thereafter, preventive interventions to improve proprioception [48] or movement and mental health such as yoga exercises may prove beneficial [64–66], as may those targeting fear of falling specifically [65,67].

However, even though studied and identified as a sizeable serious costly public health problem more than 10 years ago [68], it appears much more clarity and specificity in the design and implementation topical focus of related studies is indicated. In particular, it appears that a more distinct topical focus and agreed upon validated 'gold' standard assessments are needed to determine what should be implemented-if anything-in vulnerable older adult groups to foster falls prevention. As many falls appear to occur in conjunction with environmental factors, more ecologically oriented studies are clearly desirable even if laboratory based simulations are informative. Case studies that reveal the possible weight of personal factors, cognitive and medication factors, alongside environmental factors may help to enlighten as well as personalize what is needed and why to prevent falling injuries among osteoarthritis cases, rather than aggregate views of controlled studies accessible to only those who fulfill the study criteria, These may not accurately account for the high [40%] percentage of those with a falls history undergoing surgery [56] and question the role of home based exercises or treatment plans that are individualized, not closely monitored, or contra indicated in the face of intractable pain, depression, bone fragility and frailty, neuromuscular deficits, plus deficient cognitive ability, poor physicaland emotional status, erroneous health beliefs, and multiple medical conditions [67,69].

Clinical Implications

As per Ling [61] until more compelling deterministic data are forthcoming about the cause effect osteoarthritis falls linkage, applying what we do know carefully may have both profound health cost benefits as well as favorable longevity implications [64]. The degree of prevailing falls fears regarding falling [immense fear or no fear-that could also prove problematic] should however, be studied in its own right [67]. Additionally, the relative role of type and usage of prescribed medications, osteoarthritis severity, pain extent, walking and balance facility, extent and location of joint based impairments, and environmental safety issues requires clarification [37].

In the meantime, five assessment methods-Single-Leg Stance, Six-Minute Walk Test, Timed Up and Go Test, Chair Stand Test, and Fall Efficacy Scale – and identifying those exhibiting ;cautious' walking and hip impairments, may prove beneficial, alongside the at risk subject's cognitive, physical, and medical profile [13,37]. The individual's personal beliefs and concerns if generating anxiety warrant attention as well in our view, as do estimates of whether at risk elders will be or are able to follow and benefit from a yoga oriented program of motor training [65], dual-task gait training protocol, as well as behavioral efforts directed towards increasing falls self-efficacy [55,56-58,70,71]. The use of a falls predictive model that rests on a sound evidence base, as well as the application of inertial measures, and a sensory weighting analytic approach may also prove extremely helpful in highlighting falls mediating factors [72].

In this respect, while many options exist to help older adults and others to reduce their falls risk, the present overview leads us to believe the implementation of a well designed progressive series of supervised home based yoga practices [71,73-77] and others, wherein the goal is to increase client control over their condition, will prove more beneficial than either those conducted independently or remotely in the early stages of therapy intervention. Moreover, even though the evidence base is still considered weak [73] it appears that a well informed provider can thoughtfully analyze and curtail sources of movement fears possibly in 'real time', help counter fears and anxiety, while cautioning against pain provoking twisting, bending or excess stretching or fatiguing movements. They can gradually enhance the subject's movement confidence and frequency, extent of functional movements, and adaptive ability, while aiming to achieve optimal balance and reflex responses deemed essential for community-based active living purposes

Closing Remarks

Despite a lack of unity and a strong reliance on secondary data plus data largely focused solely on the diseased knee joint, this review confirms falls remain a serious public health threat and falls risk and events can prevail in sizeable numbers of osteoarthritis cases.

Factors underpinning this are posture, balance and muscle modulation factors.

However, cognitive responses and status [7,53,55,62,72] may play a role.

In addition, in planning to avert excess falls associated osteoarthritis disability, efforts are needed to address these parameters alongside lifestyle practices, health beliefs, muscle weakness, and atrophy, vision deficits, medication safety, and deficient reflex responsiveness, and pain.

Those in the higher age ranges, those who exhibit sarcopenia, and those requiring multiple medications to quell pain should be preferentially targeted.

In the interim-

Efforts to provide personalized and clear safety directives are essential.

Also indicated is a continuum of care, very careful monitoring, personalized goals ands strategies and clear safety directives.

To save lives as well as lower health care costs and personal distress more intense study of the key remediable attributes of falls and their otherwise deleterious outcomes in the older osteoarthritis community dwelling case is indicated.

Until then, harnessing what we have already learned and repeatedly observed is indicated,

In this regard, although many exercise modes are found helpful for improving falls risk, yoga that can be practiced in numerous ways and venues with and without an instructor is a form of exercise older adults are increasingly following with high adherence rates and that appears to be an efficacious falls moderator of high promise.

In addition, specific attention into identifying appropriate yoga postures and determining its optimal dose and mode may greatly enhance its application to averting physical dysfunction and falls [74]. Moreover, its optimal application may enable: reductions in anxiety, falls worries, and fears of falling, notable increases in wellbeing, self-efficacy, improved executive function, muscle and bone strength, sleep quality, flexibility, balance, pain control, and degree of social engagement [71,73-80].

Its advantageous features include its:

Acceptability

Feasibility for diverse populations

Low energy cost

Low financial cost

Safety record

Possible impact on reducing fears of falling, anxiety, balance, sleep, and mobility.

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Conflicts of Interest

None.

References

1. Karimi MT, Sharifmoradi K (2022) Static and local dynamic stability of subjects with knee joint osteoarthritis. Proc Inst Mech Eng H 236(8): 1100-1105.
2. Wilfong JM, Perruccio AV, Badley EM (2023) Examination of the increased risk for falls among individuals with knee osteoarthritis: a Canadian longitudinal study on aging population-based study. Arthritis Care Res (Hoboken) 75(11): 2336-2344.
3. Deng ZH, Xu J, Long LJ (2021) Association between hip and knee osteoarthritis with falls: a systematic review and meta-analysis. Int J Clin Pract 75(10): e14537.
4. Aljehani MS, Crenshaw JR, Rubano JJ, Joseph AZ, Joseph A (2021) Falling risk in patients with end-stage knee osteoarthritis. Clin Rheumatol 40(1): 3-9.
5. Konishi T, Hamai S, Fujita T, Daisuke H, Shinya K, et al. (2025) Falls and fractures after total hip arthroplasty: associations with preoperative physical function and postoperative balance confidence, with insights from cluster analysis. JB JS Open Access 10(4): e25.
6. Zhang Y, Li X, Wang Y, Liru G, Farming P, et al. (2023) Association of knee and hip osteoarthritis with the risk of falls and fractures: a systematic review and meta-analysis. Arthritis Res Ther 25(1): 184.
7. Cheng LY, Chien YC, Lin TT, Lin JY, Cheag HT, et al. (2025) Assessment of gait and balance in elderly individuals with knee osteoarthritis using inertial measurement units. Sensors (Basel) 25(20): 6288.
8. Rosadi R, Jankaew A, Wu PT, Kuo LC, Lin CF, et al. (2022) Factors associated with falls in patients with knee osteoarthritis: a cross-sectional study. Medicine (Baltimore) 101(48): e32146.
9. GBD 2023 Disease and injury and risk factor collaborators (2025) Burden of 375 diseases and injuries, risk-attributable burden of 88 risk factors, and healthy life expectancy in 204 countries and territories, including 660 subnational locations, 1990-2023: a systematic analysis for the global burden of disease study 2023. Lancet 406(10513):1873-1922.
10. Bhatt M, Shah M, Rathi M (2025) Effect of ankle neuromuscular exercises and mat exercises on chronic ankle instability and balance in overweight and obese individuals. Foot Ankle Spec 19386400251371136.
11. Ager E, Jones A, Lewis A, Chinemerem N, Kim T, et al. (2025) Medical conditions and medications associated with falls in low-income community-dwelling older adults. Sr Care Pharm 40(10): 424-430.
12. Zhang Q, Liu T, Xie H, Zhang H, Kuan Z, et al. (2025) Refined proprioceptive feedback framework for spatiotemporal mapping of spinal afferent input during gait in female knee osteoarthritis patients. IEEE Trans Neural Syst Rehabil Eng 33: 4614-4623.
13. Britting S, Krumpoch S, Lindemann U (2025) The interaction of gait characteristics and concerns about falling in community-dwelling older adults. Sci Rep 15(1): 43815.
14. Ceolin C, Siviero P, Limongi F, Noale M, Serg G, et al. (2025) EPOSA research group. impact of a four-domain intrinsic capacity measure on falls: findings from the EPOSA study. Front Aging 6: 1645712.
15. Chan DOM, Subasinghe ARSS, Wang S, Chan PK, Cheung RT, et al. (2024) Whole-body angular momentum during stair ascent and descent in individuals with and without knee osteoarthritis. Sci Rep 14(1): 30754.
16. Hemmati F, Rusta MM, Karimi MT, Haghpanah SA, Bahareh ZG, et al. Variability in inter-segmental coordination of the lower limb in older adults during walking: an analysis with toe-only rocker sole shoes. Proc Inst Mech Eng H 239(9): 952-965.
17. Mat S, Tan PJ, Ng CT, Fadzil F, Rozalli FI, et al (2015) Mild joint symptoms are associated with lower risk of falls than asymptomatic individuals with radiological evidence of osteoarthritis. PLoS One 22:10(10). e0141368.
18. Manlapaz DG, Sole G, Jayakaran P, Chapple CM (2019) Risk factors for falls in adults with knee osteoarthritis: a systematic review. PM R 11(7): 745-757.
19. Norouzi P, Javadian Y, Hosseini SR (2023) Comparison of falls and its determinants in the elderly with and without knee osteoarthritis. J Babol University of Med Sci 25(1): 46-57.
20. Raizah A, Reddy RS, Alshahrani MS, Tedla JS, Dixit S, et al. (2023) Investigating knee joint proprioception and its impact on limits of stability using dynamic posturography in individuals with bilateral knee osteoarthritis-a cross-sectional study of comparisons and correlations. J Clin Med 12(8): 2764.
21. Iosimuta N, Santos WN, Sousa T (2022) Number of falls in elderlies and adults with knee osteoarthritis (KOA). Arch Phys Med Rehabil 103(3): e36.
22. Iijima H, Aoyama T (2021) Increased recurrent falls experience in older adults with coexisting of sarcopenia and knee osteoarthritis: a cross-sectional study. BMC Geriatr 21(1): 698.
23. van Schoor NM, Dennison E, Castell MV, Cooper C, MH Edwards, et al. (2020) EPOSA research group. Clinical osteoarthritis of the hip and knee and fall risk: the role of low physical functioning and pain medication. Semin Arthritis Rheum 50(3): 380-386.
24. Leung KL, Li Z, Huang C, Huang C, Huang X, et al. (2024) Validity and reliability of gait speed and knee flexion estimated by a novel vision-based smartphone application. Sensors (Basel) 24(23):7625.
25. Abdallat R, Sharouf F, Button K, Ai Amri. (2020) Dual-task effects on performance of gait and balance in people with knee pain: a systematic scoping review. J Clin Med 9(5): 1554.
26. Amano T, Tamari K, Suzuki N (2021) Cross-validation of a screening tool to distinguish between fallers and nonfallers in community-dwelling older adults with knee osteoarthritis. Arch Phys Med Rehabil 102(4): 598-603.
27. Le Rossignol S, Fraser E, Grant A, Doma K, Wilikinson M, et al. (2023) Patients with knee osteoarthritis have altered gait and gaze patterns compared to age-matched controls: a pilot study. PLoS One 18(11): e0283451.
28. Devassy SM, Scaria L (2023) Prevalence and risk factors for falls in community-dwelling older population in Kerala; results from a cross sectional survey. Heliyon 9(8): e18737.
29. Harris R, Strotmeyer ES, Sharma L, Kwoh CK, Jennifer SB, et al. (2023) The association between severity of radiographic knee osteoarthritis and recurrent falls in middle and older aged adults: the osteoarthritis initiative. J Gerontol A Biol Sci Med Sci 78(1): 97-103.
30. Taqi A, Gran S, Knaggs RD (2021) Current use of analgesics and the risk of falls in people with knee osteoarthritis: a population-based cohort study using primary care and hospital records. Osteoarthr Cartil Open 3(2): 100165.
31. Ragusa FS, Di Bella G, Dominguez LJ, Veronese N, Smith L, et al. (2024) The role of the World Guidelines for Falls Prevention and Management's risk stratification algorithm in predicting falls: a retrospective analysis of the Osteoarthritis Initiative. Age Ageing 53(8): afae187.
32. Huang J, Hu X, Wang T (2025) The causal link between osteoarthritis and falls: the mediating role of paracetamol. Aging Clin Exp Res 37(1): 232.
33. Capiau A, Huys L, van Poelgeest E, NathalieV, Mirko P (2023) EuGMS Task, Finish Group on FRIDs. Therapeutic dilemmas with benzodiazepines and Z-drugs: insomnia and anxiety disorders versus increased fall risk: a clinical review. Eur Geriatr Med 14(4): 697-708.
34. Ferlinc A, Fabiani E, Velnar T, Gradisnik L (2019) The importance and role of proprioception in the elderly: a short review. Materia Socio-Medica 31(3): 219.
35. Ofori-Asenso R, Ackerman IN, Soh SE (2020) Prevalence and correlates of falls in a middle-aged population with osteoarthritis: data from the osteoarthritis initiative. Health Soc Care Community 29(2): 436-444.
36. González OA, Ramos RD, Higueras CF, Carla T, Cruz DR, et al. (2022) Classification of center of mass acceleration patterns in older people

with knee osteoarthritis and fear of falling. Int J Environ Res Public Health 19(19): 12890.

37. Knox PJ, Coyle PC, Pugliese JM, Pohilg RT, et al. (2021) Hip osteoarthritis signs and symptoms are associated with increased fall risk among community-dwelling older adults with chronic low back pain: a prospective study. Arthritis Res Ther 23(1):71.

38. Lee PA, Wu KH, Lu HY, Kai WS, Ting MW, et al. (2021) Compromised balance control in older people with bilateral medial knee osteoarthritis during level walking. Sci Rep 11(1): 3742.

39. Soh SE, Barker AL, Morello RT (2020) Applying the International Classification of Functioning, Disability and Health framework to determine the predictors of falls and fractures in people with osteoarthritis or at high risk of developing osteoarthritis: data from the Osteoarthritis Initiative. BMC Musculoskelet Disord 21(1): 138.

40. Ren X, Lutter C, Kebbach M, Bruhn S, Yang Q, et al. (2022) Compensatory responses during slip-induced perturbation in patients with knee osteoarthritis compared with healthy older adults: an increased risk of falls? Front Bioeng Biotechnol 10:893840.

41. de Freitas REJ, de Freitas JGA, Vieira CP, Daniela CE, et al. (2023) Analysis of postural control in patients diagnosed with unilateral knee osteoarthrosis and its relationship with the risk of falls. Adv Orthop 2023:5536304.

42. Ackerman IN, Barker A, Soh SE (2023) Falls prevention and osteoarthritis: time for awareness and action. Disability Rehabil 45(4): 733-738.

43. Mawarikado Y, Uchihashi Y, Inagaki Y (2025) Relationship between history of falls and foot pressure centre parameters during gait and stance in patients with lower-limb osteoarthritis. Sci Rep 15(1): 26723.

44. Zheng Z, Luo H, Xu W, Shi L, Wang F, et al (2023) Association between elevated magnesium intake and reduced risk of recurrent falls and frailty in osteoarthritis: data from the Osteoarthritis Initiative. J Nutr Health Aging 27(9): 775-784.

45. Delbari A, Azimi A, Najafi M, Saatchi M, Bidkhori M, et al. (2023) Prevalence, complications, and risk factors of falls and fear of falling among older adults; based on Ardakan Cohort Study on Aging (ACSA). Arch Acad Emerg Med 12(1): e9.

46. Mawarikado Y, Inagaki Y, Fujii T, Takanari K, Akira K, et al. (2023) Relationship between fall history and toe grip strength in older adults with knee osteoarthritis in Japan: a cross-sectional study. PLoS One 18(3): e0282944.

47. Taniguchi M, Sawano S, Maegawa S, Ikezoe T, Ichihashi N (2021) Physical activity mediates the relationship between gait function and fall incidence after total knee arthroplasty. J Knee Surg 34(11): 1205-1211.

48. Sohn J, Kim S (2015) Falls study: Proprioception, postural stability, and slips. Bio-med Materials Engin 26(1_suppl): S693-703.

49. Fukaya T, Mutsuzaki H, Mori K (2022) Sway and acceleration changes of the center of mass during walking stance phase before and after total knee arthroplasty. Geriatrics (Basel) 8(1): 2.

50. Kiyohara M, Hamai S, Okazaki K, et al. (2022) Evaluation of the balance function before and after total knee arthroplasty using Berg balance scale. Arch Orthop Trauma Surg 142(11): 3461–3467.

51. Sakurai K, Yanai R, Isozaki T, Nobuyuki Y (2024) Relationship between falls and the use of hypnotics, antidepressants, antipsychotics, and anxiolytics in patients with rheumatoid arthritis: A cross-sectional study. Mod Rheumatol 35(1): 64-71.

52. Fernandes VO, Moreira BS, de Melo GASC, Núbia CPA, Henrique SC, et al. (2024) Factors associated with fear of falling in older women with knee osteoarthritis: a cross-sectional study. Geriatr Nurs 55: 333-338.

53. Khan NF, Bykov K, Katz JN, Robert JG, Seanna MV, et al. (2024) Risk of fall or fracture with concomitant use of prescription opioids and other medications in osteoarthritis patients. Pharmacoepidemiol Drug Saf 33(3): e5773.

54. Blasco JM, Pérez-Maletzki J, Díaz-Díaz B, Antonio SM, Ignacio MG, et al. (2022) Fall classification, incidence and circumstances in patients undergoing total knee replacement. Sci Rep 12(1): 19839.

55. Shinonaga A, Matsumoto H, Uekawa M, Kengo F, Hiroki S, et al. (2025) Association between fatty infiltration of the gluteus medius muscle and falls after total hip arthroplasty in female patients with unilateral primary hip osteoarthritis: a retrospective cohort study. Geriatr Gerontol Int 25(12): 1812-1820.

56. Saokhieo P, Pliannuom S, Vidhayakula N, Isares T, Thanapat P, et al. (2025) Factors associated with falls in older adults: a retrospective hospital-based study using comprehensive geriatric assessment in Thailand (2020-2023). J Prim Care Community Health 16:21501319251385068.

57. Hu Y, Ren Q (2025) Daily activity limitations and fall risk among older Chinese adults with arthritis: Exploring contributing factors. Prev Med Rep 57: 103184.

58. Yoshikawa A, Wu HS (2025) Factors associated with falls among community-dwelling older adults with osteoarthritis: a sex subgroup analysis. J Appl Gerontol 7334648251332436.

59. Kiko Y, Uchitomi H, Matsubara M, Miyake Y (2025) Gait characteristics of fallers and nonfallers in female patients with unilateral end-stage hip osteoarthritis. Healthcare (Basel) 13(6): 654.

60. Maariya K, Vanitcharoenkul E, Chotiyarnwong P, Nath A, Aasis D. (2025) High prevalence of symptomatic knee osteoarthritis among patients who have fragility hip fractures. J Arthroplasty 40(8): 2179-2185. e1.

61. Ling SM, Bathon JM (1998) Osteoarthritis in older adults. JAG 46(2): 216-225.

62. Witard OC, Hughes AK, Morgan PT, Mads L, Phillip JH, et al. (2025) Protein-based perioperative nutrition interventions for improving muscle mass and functional outcomes following orthopaedic surgery. Exp Physiol 110(12): 1802-1809.

63. Charlton K, Stagg H, Burrow E (2023) The clinical effectiveness of a falls rapid response service, and sex differences of patients using the service: a cross-sectional study in an English ambulance trust. Br Paramed J 8(1): 28–33.

64. Diep NT, Nguyen TV, Phuong BTM (2025) Risk of falls in the older adult at Thai Binh Medical University Hospital and its related factors in 2024. Front Public Health 13: 1609745.

65. Oliveira ARC, Magueja CMP, Gonçalves de Almeida AM (2026) Actions to control the fear of falling in older people: an umbrella review. Arch Gerontol Geriatr 141: 106087.

66. Sobhani V, Hashemi SE, Mir SM (2024) Impact of proprioceptive exercises on pain, balance, . and fall risk in the elderly with knee osteoarthritis: a randomized clinical trial. Cureus 16(10): e70885.

67. Silangirn P, Chaichana K, Thummayot S, Phanit S, Uratcha S, et al. (2024) Study of knee pain, fear of falling, and quality of life among community-dwelling older adults, Northern Thailand. Narra J 4(2): e915.

68. Ng CT, Tan MP (2023) Osteoarthritis and falls in the older person. Age and Ageing 42(5): 561-566.

69. Grønne DT, Ryg J, Rubin KH, Kim D, Ewa MR (2025) Prevalence of concerns about falling in people with knee or hip osteoarthritis and the association with pain, function, and psychological factors-a cross-sectional study of 7442 patients treated in primary care. Age Ageing 53(10): afae224.

70. Jattanond W, Sutalangka C, Namkorn P, Ekalak S, Siripatra A, et al. Integrating cognitive and motor dual-task training to prevent fall risk among community-dwelling elderly in Thailand: a randomized controlled study. J Prev Med Public Hlth 58(6): 609-619.

71. Bajaj P, Nagendra L, Bajaj A, MIny S, Manju C, et al. Effect of yoga on balance, falls, and bone metabolism: a systematic review of randomized controlled trials in healthy individuals. Osteoporos Int 36(2): 193-224.

72. Aoki R, Shindo M (2025) Preliminary investigation on vertical ankle sway in static standing under eyes-closed and foam pad conditions.

Annu Int Conf IEEE Eng Med Biol Soc 2025: 1-4.

73. Yao CT, Tseng CH (2019) Effectiveness of chair yoga for improving the functional fitness and well-being of female community-dwelling older adults with low physical activities. Topics in Geriatr Rehabil 35(4): 248-254.

74. Huang TC, Li C, Hsieh CY (2025) The effects of yoga on fall-related physical functions for older women: a systematic review of randomized controlled trials. Healthcare (Basel) 13(2): 124.

75. Martens NL (2022) Yoga interventions involving older adults: integrative review. J Gerontol Nurs 48(2): 43-52.

76. Saud A, Abbasi M, Merris H, Pranav P, Xaviar MJ, et al. (2022) Harnessing the benefits of yoga for myositis, muscle dystrophies, and other musculoskeletal disorders. Clin Rheumatol 41(11): 3285-3297.

77. Yu H, Zhong J, Li M, Chen S (2025) Effects of exercise intervention on falls and balance function in older adults: a systematic review and meta-analysis. Peer J 13: e20190.

78. Khuna L, Plukwongchuen T, Yaemrattanakul W (2025) Discriminative ability of functional performance tests on risk of falling among older adults with knee osteoarthritis: a cross-sectional study. Medicine (Baltimore). 104(21): e42578.

79. Alenazi AM (2025) Multisite pain is longitudinally associated with an increased risk of fall among older adults with or at risk of knee osteoarthritis: data from the Osteoarthritis Initiative. Am J Phys Med Rehabil 104(5): 452-457.

80. Ragusa FS, Di Bella G, Dominguez LJ, Nicola V, Lee S, et al. (2024) The role of the World Guidelines for Falls Prevention and Management's risk stratification algorithm in predicting falls: a retrospective analysis of the Osteoarthritis Initiative. Age Ageing 53(8): afae187.