

**Editorial Article**

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Falls Injuries among Free Living Community-Dwelling Older Adults: Is Yoga Helpful or Not?

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***Corresponding author:** Ray Marks, Department of Clinical Research and Education, Osteoarthritis Research Center, Canada.**Received Date:** October 30, 2023**Published Date:** November 07, 2023**Abstract**

Falls that occur at high rates among community dwelling older adults produce many adverse health outcomes in all parts of the world. This mini review examines current 2023 published works focusing on yoga exercises as one approach for mitigating falls incidence and severity in older adults due to their apparent impacts on multiple potentially remediable falls risk factors identified in this body of literature including anxiety states and symptoms, balance capacity, fears of falling, and poor muscle and bone health. Drawn largely from the English language peer reviewed works posted on PUBMED, PubMed Central, CINAHL, and GOOGLE SCHOLAR between January 1, 2023-October 30, 2023, most listed articles that focused on the aforementioned topic were scrutinized and examined. Although limited in quantity as well as robust research, these data show, a sizeable proportion of older adults living in the community continue to incur injurious falls at substantive rates despite years of research, often having no signs of cognitive decline, and despite exposure to public health preventive efforts. However, those that practice chair or modified forms of yoga exercises may reduce their falls risk and falls injury severity, and possibly save much suffering.

Keywords: Aging; Falls; Falls Injuries; Fears of Falling; Older Adults; Prevention; Yoga**Introduction**

Falls and falls injuries continue to represent an oftentimes unexpected event that could result in a series of one or more functional and distressful persistent impairments and an ensuing cycle of increasing debility among large numbers of older adults living in the community, regardless of their health status, country of origin, and despite years of preventive intervention attempts to limit this form of injury [1-3]. Commonly, if undetected or recognized, falls events may invoke or exacerbate long-term physical disability, severe dependency, and hospitalizations [4], for example due to life threatening fractures [5] and serious falls injuries [6].

While psychological disturbances in their own right can undoubtedly heighten falls risk, important physical determinants

of falls include poor balance control, muscle function, muscle and bone mass declines. A psychological state implicating the fear of falling and its association with confidence perceptions about one's own ability to mitigate falls that often results in sedentary behaviors [7-10] can surely contribute to increases in muscle weakness, and depression- key attributes of the propensity to fall [11] and strong predictors of future falls [12].

Accordingly, efforts to reduce falls fears as well as evidence of muscle mass declines and poor balance may arguably be expected to lessen the rates of injurious falls incurred in the homes of older adults [13]. However, despite widespread public health initiatives and community-based efforts over the years to educate and alter environments that raise falls risk, these do not always embrace

important individual safety and health issues such as excess fears of moving in a strategic personalized ongoing manner [13, 14].

As such, it is plausible that as opposed to regular exercises that may yet help, yoga may be of specific help in improving adherence to exercise, as well as having objective impactful effects on wellbeing, while reducing their fears of falling [15], along with any unwanted decline in muscle and bone mass [16].

Aim

This mini review aimed to examine if yoga applications or modifications thereof can be recommended for safely reducing falls risk in general, and especially fears of falling among older community bound adults.

Relevance

Falls injuries are undisputed impediments to wellbeing among many older populations that commonly engenders various degrees of anxiety and depression [8, 17] that alone can be expected to diminish life quality, as well as laying the ground for possible parallel increases in falls risk, as well as fears of falling.

Due to their high treatment costs, and possible long-term repercussions, a concurrent loss of confidence, as well as activity avoidance, due to 'fears of falling' is a well-established set of negative beliefs that may prove highly disabling if poorly addressed or overlooked. These psychosocial based falls correlates of fears related to moving and falling not only predict progressive disability, but predict less than desirable outcomes of fracture surgery, further falls fears, anxiety, and low falls self-efficacy. Moreover, muscle and bone mass declines that may ensue clearly reduce the chances of successful aging and a high life of quality. They predict recurrent falls, a possible need for substantive periods of hospitalization, and possible, discharge to a nursing home.

Hypotheses

Based on what is known, and subject to future study, it is hypothesized that anxiety, as well as fears of falling and hence falls risk can be favorably addressed through carefully staged and adapted yoga practices. Along with its utility to foster muscle strength, agility, and static as well as dynamic balance [18], an older vulnerable adult may experience less pain, physical plus social dysfunctions, and life quality improvements even if the individual has fallen and sustained an acute hip fracture [19].

Methods

Using the PUBMED, PubMed Central, CINAHL, and GOOGLE SCHOLAR data bases, recent articles or information sources detailing or examining falls risk and features of anxiety and functional challenges as related to falls injuries in the community among older adults with no known cognitive deficits published between 2022-2023 was sought. PUBMED in its own right was deemed reliable and representative of the documents reporting the issue at hand when applying the key words: anxiety, falls, hip fractures, older adults, and yoga/therapy. All forms of relevant documentation were deemed acceptable and are relayed here in narrative form. Nursing home or long-term care studies, exercise or

falls prevention studies other than yoga related were not examined. As well, studies on younger or middle-aged adults, studies on specific health conditions, virtual reality balance and gait, tele-yoga, community based or group-based yoga interventions, and reports published before 2022 were largely excluded.

Results

Although falls are common among older adults, and many factors underpinning falls propensity may be remediable, what is specifically needed to minimize falls incidence and prevalence among older adults residing in the community, and what works best is generally understudied or studied but not in well-designed randomized prospective trials. For example, older adults with symptoms of depression and anxiety [4, 20, 21] and postural instability [12], that may be more prominent in older frail adults with a tendency to fall if weak, along with the impact of multiple medications and/or fear of falling, may benefit from a program that has the ability to safely address one or more of these possible determinants, including depression, cardiovascular instability, stress, sleep quality, but what that program should look like or incorporate is hard to envision [22].

In this regard, yoga, an ancient form of exercise that has been studied for more than 100 years [23] and that can be practiced in numerous ways and venues with and without an instructor is a form of exercise that older adults are increasingly following with high adherence rates. Moreover, multiple apparent benefits from participation can occur, most notably in their measures of psychological and physical health. These may include reductions in anxiety and fears of falling, notable increases in wellbeing, self-efficacy, improved executive and immunological function, strength, sleep, fatigue, flexibility, and balance [24, 25].

In another realm, the older adults who has fallen may have experienced varying degrees of trauma that may respond favorably to yoga therapy and should not be ignored [26], while Xing et al. [27] propose that balance capacity in its own right, a possible falls risk determinant in a high percentage of the aging population [28] may be improved favorably by consistent and well-designed personalized yoga or similar exercises. In another study, where Fabrega-Cuadros et al. [29] assessed the impact of psychological distress and sleep quality on balance confidence, muscle strength, and functional balance in 304 community-dwelling middle-aged and older adults, the results of their multivariate linear and logistic regressions showed higher anxiety values, fatigue, and using sleep medication were linked to falling, thus yoga exercises to mitigate this could prove highly valuable. Indeed, anxious older adults are found to exhibit less proficiency on standing at an elevated level and undergoing postural sway tests than non-anxious control subjects, thus more likely to experience one or more falls [30].

According to Serrano-Checa et al. [17] in addition to well-known falls risk factors such as gait, dynamic balance, and functional mobility problems, sleep disturbances, anxiety, and depression that are highly prevalent factors among older women may play a profound role and should be duly addressed and remediated where possible. In particular, their study showed that poor sleep

efficiency and the use of sleeping medication were related to signs of decreased gait speed, poor functional mobility, and further depression. Additionally, increased symptoms of anxiety and depression were associated with worsened dynamic balance, a key falls risk factor. It thus appeared that if undetected or unaddressed in a timely efficacious manner, one or more of these intrinsic falls risk factors and others may not only lead to a lack of motivation to move, but also to excess movement fears, mobility dysfunction, and frailty [31-35].

Ellmers et al. [36] who examined the relationship of anxiety and high-risk patterns of visual search in 44 older adults during adaptive locomotion among older adults deemed to be at a high risk of falling found a link between heightened fall-related anxiety and "high-risk" visual search behaviors and that these were cognitive attributes associated with greater stepping errors. As per Viaje et al. [37] who investigated the effect of a visuospatial dual-task on stepping performance in an older adult population with and without falling concerns and the impact of repeating this task in those with high concern about falling concluded that older adults with higher general concerns about falling tended to experience more difficulties during a dual-task condition than those with lower concern levels. Of further interest was that 'worse' sensorimotor and cognitive functioning heightened this effect.

Another highly relevant cross-sectional, as well as longitudinal study conducted by Choi et al. [38] that examined whether worrying about falls restricts social engagement in older adults showed anxiety was significantly associated with both informal and formal social engagement restrictions at time two, even when controlling for falls incidents and changes in health status and other covariates. The findings underscored the importance of reducing fall worry and preventing social disengagement in late life, as well as possibly during any ensuing period of imposed or prolonged home-based social isolation.

As observed by Zhao et al. [39], whereas falls in community-dwelling older adults are a complex phenomenon attributed to a variety of socio demographic factors, health conditions, functional problems, and environmental factors, this group found that homebound or semi-homebound older adults were 50% more likely to experience a fall than non-homebound individuals. Impaired balance was the strongest falls predictor, followed by problems moving around in the home. Additional risk factors were arthritis, depression or anxiety.

Other reports imply that falls prevention while essential is not a simplistic practice that can be readily employed without the careful interplay of multiple health personnel and others [40] and may require considerable time and support to yield desirable results [41]. In this regard, although other forms of exercise may be helpful [42], the observed dual effects of yoga practice on cognitions as well as possibly on muscle and bone health, even if the yoga regimen is modified, may help alleviate the magnitude of several falls determinants such as anxiety, limited confidence to walk, poor muscle endurance and flexibility, postural control, and stress [43, 44]. At the same time, excess drug and/or medication usage and pain may diminish, and sleep may improve as well as

movement confidence, movement coordination, muscle strength, pain, balance and life quality especially among previous fallers [44-48]. Most salient to address however appear to be any remediable psychological fear-associated responses that preempt movement or exercise participation as noted by some contemporary researchers [41, 49-54].

Other intrinsic factors believed to contribute to fall risk among older adults are:

- 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
- Sources: [31-35, 55-60]

In short, as noted above, multiple factors, especially anxiety and fear are consistently found to raise the risk for falling, regardless of age range, and in light of the possible interaction of anxiety with one or more of the above mentioned falls correlates, even with limited data, may induce disability and/or ongoing and cascading influences that further enhance falls vulnerability, as well as raising the risk for serious recurrent falls, muscle mass and mobility limitations that can provoke or exacerbate falls fears and a life quality decline [61], plus a high chance of sustaining a fracture [62]. In this respect, the use of well-chosen yoga exercises may prove helpful for purposes of advancing primary falls prevention goals as well as secondary or tertiary [post falls events] reductions in disability, and possible protection against highly debilitating recurrent falls [63, 64]. Associated post yoga exercise improvements include static, dynamic and total balance scores, falls self-efficacy scores, calmness, happiness, excess fatigue, nervousness and depression, muscle mass, body composition, and social status benefits [63].

Gilchrist et al. [65] affirm that exercise such as yoga that targets balance and strength can be applied to prevent falls in older adults. In applying the Successful AGEing yoga-controlled trial to the test, their results showed that relaxation, breathing, and yoga's mind-body connection created a satisfying internal focus on bodily sensation that was reportedly valued by the participants. Thus, although evidence in support of yoga as a falls and falls fears

preventive strategy in older adults is not at all robust - balance capacity, as well as falls determinants such as overall wellbeing and pain symptoms plus body awareness and cervical tactile sensitivity [48] appear to be effectively impacted [66]. Favorable impacts have also been detected on frailty markers, gait speed, low extremity strength, balance and other physical health indicators [67].

It appears yoga exercises including chair yoga can be applied safely to reduce functional limitations, pain, muscle strength declines, while fostering improvements in balance and gait scores, muscle strength, pain, and general endurance of an older adults at risk for falling [68]. In addition, a growing body of research supports yoga practices for fostering sleep and stress control. Falls mitigation efforts may be impacted favorably if yoga allows the individual to build up their muscle strength and agility [59]. To avert a cycle of negative events, and one that may mediate fears of falling and their repercussions, special attention to anxious and depressed older adults is advocated in this regard [41, 50].

Discussion

Falls have been and continue to be a leading cause of death and loss of independence among older persons in the United States and elsewhere, affecting at least one in three or as many as one in two elderly adults over age 65 annually. Even if not inevitable, a further 20-30 percent of survivors may fall subsequently [60] and incur further injury and disability [64]. Importantly they may acquire increased psychological as well as physical disadvantages [38, 54]. In addition to enormous physical costs in terms of disability, if the faller survives, the overall economic and social costs of falls injuries are enormous.

In this regard, this mini review elected to selectively focus on establishing if there is some growing evidence to support the view that anxiety, and fear of falling leading to self-imposed movement restrictions [49] can independently or collectively foster falls, which in turn can predictably engender a high rate of significant injuries and adverse health outcomes, and if modified tailored yoga practices may prove helpful in the prevention of one or more falls, and a high rate of risk for injuries and excess disability as has been discussed previously [69].

However, even if yoga practice has potential to impact a host of falls risk factors that are possibly reversible [70] and could be amenable to the long term or short-term effects of yoga this is not a well-studied realm of endeavour to date. In addition, although many articles on falls have specifically discussed the unique situation of many community dwelling adults, the fact more older adults are being encouraged to remain in the community, but may in fact not be as healthy as anticipated following COVID-19, suggests they may be an especially vulnerable group for years to come. Moreover, even if only considering the potent role of anxiety in general as a key cause of falls, strategies that can mitigate anxiety and build self-efficacy for averting falls [71] do appear of high value to enact and study further. Indeed, the widespread notion that technology can help older adults to climb and descend stairs and identify a falls event, assistive devices can enable mobility, and acute care can be summoned in a timely way as indicated if a fall occurs and that may

impact falls and associated injury rates, these technical devices may not take into account the need for the older adult who wants to be independent to develop or foster their overall physical and mental wellbeing. These health attributes may include the need to be 'fit' and responsive as well as cautious with sound judgement and timely well calibrated reflexive responses, for example to counter an unexpected obstacle or perturbation while performing a secondary motor task, such as walking while using a health device.

In this regard, it appears safe to say that current public health guidelines for protecting older adults health status may clearly be unable to selectively counter or address those health conditions 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 and may well evoke anxiety and fears of exercising, rather than encouraging these.

Moreover, expecting an older at risk adults with mild cognitive impairments, visual challenges, severe depression and anxiety, 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 [72]. Even in the presence of a compassionate caregiver, they must be sufficiently informed in this respect.

Similarly, although modified yoga appears a viable alternative, asking house bound older adults to follow video or remote programs 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 [73] 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 [15], are potentially of special import in efforts to avert falls and possible falls risk and disordered sleep patterns [74, 75].

According to Zhao et al. [39] who examined risk factors for falls in homebound community-dwelling older adults, this subgroup is more likely than not to benefit markedly, if they are able to reduce their chances of one or more falls injuries in the future along with any increased burden of chronic health problems, plus emotional and functional health challenges and limitations. Those who exhibit anxiety and fear of falling, and/or frailty, or have fallen recently, plus those who take multiple medications are most likely to be at high risk in this regard and might be selectively targeted and screened periodically [35, 53, 74].

In particular, even if Johnson [76] who used yoga to successfully extend their subject's hip range of extension motion, but not their initial fears of falling, the benefits of a more personalized falls prevention effort coupled with a well-designed set of progressive yoga practices may yet yield desirable declines in the subject's

fear of falling as well as mobility improvements. In the interim, sufficient evidence points to the added importance of helping the older vulnerable adult to understand how to avoid over exercising, incorrect exercise approaches, 'highly glamorized' media-based yoga directives, and stress in general.

Other data imply that attention to all fall risk factors in the homes of older community dwelling adults should not be neglected even if the older adult is receiving rehabilitation care specifically. At the same time, keeping older adults healthy and protected from succumbing to excess weakness or frailty may clearly warrant specific ongoing insightful attention. Identifying and limiting excess exercise induced muscle pain or discomfort as far as possible, along with a compassionate, caring, long term holistic approach to securing all elements of wellbeing, including emotional wellbeing would also be especially helpful in all likelihood.

More research to examine these issues and how best to minimize fears of falling, which may heighten frailty is strongly indicated in the interim.

Until then, and to counter some of the above-mentioned factors that foster falls risk and their oftentimes adverse outcomes, it appears that several attributes of yoga do appear advantageous, including their:

1. Acceptability by older adults
2. Feasibility for diverse populations
3. Low energy cost
4. Low financial cost
5. Safety record
6. Possible impact on reducing fears of falling
7. Effectiveness as far as reducing anxiety, fostering balance, sleep, and mobility [15, 45, 47, 51, 65, 69, 77, 82]

To achieve an optimal impact, as per Ang et al. [83] and Arnold et al. [84] the support of an empathetic well informed health team as well as family members and caregivers along with a clear differential initial diagnosis appears essential in efforts to foster maximal yoga exercise participation, favorable falls and falls fears mitigation results, and reduced health costs. In addition, communications that are encouraging and do not provoke distress, but focus rather on fostering self-compassion and mindfulness are highly indicated as well. Also, key is an effort to incorporate participatory goal setting and a plan that aligns with the adult's values and abilities.

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 that the implementation of a well-designed progressive series of supervised home based yoga practices 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, it appears that a well-informed provider can thoughtfully analyze and curtail sources of movement fears possibly in 'real time',

while cautioning against twisting, bending or excess stretching 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 living purposes [8, 52, 78]. In particular, even though understudied, there is little documented disagreement that ongoing efforts to avert both state and trait anxiety and depression among vulnerable community bound older adults through an exercise oriented modality as one component appears key to reducing falls risks, injuries, physical function declines, disability, and excess related deaths in this regard [65, 79-82, 85, 86].

Concluding remarks

Although it is impossible to validate a significant role for yoga in efforts to mitigate falls rates and their severity in community dwelling adults, it appears safe to say that while-

- Laudable multi-pronged public health preventive measures prevail, these have not eradicated falls injuries among older community dwelling adults, a population expected to increase markedly by 2050.
- Exercise is commonly promoted as a universal falls preventive strategy, not all forms of exercise may prove safe in this regard, for example if these involve twisting or high impact repetitive movements, whereas the practice of certain forms of low impact low energy self-or moderately paced yoga movements may prove highly valuable especially in reducing fearful cognitions that can inadvertently contribute to falls injuries and their risk among vulnerable older adults.
- Efforts to provide personalized and clear safety directives in this regard are likely to be best in the case of those older adults who are homebound, and have health challenges and live alone, a continuum of care including very careful monitoring and guidance of the adult in carrying out the yoga techniques is strongly advocated.
- More intense study of the key remediable attributes of home-based yoga adaptations is indicated to save lives as well as health care costs and personal distress, more should be done currently to harness what we have already learned and repeatedly observed.

Conflict of interest

None.

Acknowledgment

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