Yoga implications for preventing accidental falls in older adults: a systematic review

Implicações do yoga para prevenção de quedas em idosos: uma revisão sistemática

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Abstract

Introduction: Studies have shown the importance of healthy habits in older adults, emphasizing physical activity or mobility for a better quality of life and to delay physical degeneration in this population. Yoga is one of several exercises recommended for therapeutic purposes to reduce the risk of falls, a common occurrence in this age group. **Objective:** To synthesize the existing evidence regarding the effects of yoga on quality of life and physical-functional capacity and its contribution to fall prevention in older people. **Methods:** This systematic review was conducted in August 2020 on the Medline/Pubmed, LILACS, SCOPUS, Web of Science and PEDro databases, with no restrictions for language or year of publication. In line with the eligibility criteria, randomized or quasi-randomized clinical trials were included. **Results:** A total of 1,190 articles were found, 18 of which were included for data collection. The average sample size was between 16 and 120 participants, consisting of older individuals of both sexes ranging in age from 62 to 85 years. **Conclusion:** Regular yoga practice has a beneficial effect on the quality of life and physical-functional capacity of older adults, thereby contributing to fall prevention. However, evidence is still limited and further studies are suggested to better elucidate the scope of the effects of yoga as a therapeutic resource.

Keywords: Accidental falls. Aging. Healthy aging. Yoga.

Resumo

Introdução: *Estudos têm demonstrado a importância dos hábitos saudáveis em idosos, enfatizando a atividade física ou mobilidade como categoria para uma melhor qualidade de vida nas condições orgânicas e retardo da degeneração física nesse grupo populacional. Dentre diversas atividades físicas, o yoga é conhecido como um dos exercícios indicados e utilizados de forma terapêutica, que pode reduzir o risco de quedas, sendo este um evento prevalente nessa faixa etária.* ***Objetivo:*** *Sintetizar as evidências existentes quanto aos efeitos da prática de yoga na qualidade de vida e capacidade físico-funcional que possam contribuir para a prevenção de quedas em idosos.* ***Métodos:*** *Trata-se de uma revisão sistemática, cujas buscas foram realizadas em agosto de 2020 nas bases de dados Medline/Pubmed, LILACS, SCOPUS, Web of Science e PEDro, sem restrições linguísticas ou de ano de publicação. Seguindo os critérios de elegibilidade, foram incluídos estudos do tipo ensaio clínico randomizado ou quase randomizado.* ***Resultados:*** *Foram encontrados 1190 artigos, sendo incluídos 18 para a coleta dos dados, os quais tinham como amostra uma média de 16 a 120 participantes, sendo esses idosos de 62 a 85 anos e de ambos os sexos.* ***Conclusão:*** *A prática regular de yoga promove benefícios sobre a qualidade de vida e capacidade físico-funcional de idosos que contribuem para a prevenção de quedas. No entanto as evidências ainda são limitadas e sugerem-se novos estudos para melhor elucidação da abrangência dos efeitos do yoga como recurso terapêutico.*

Palavras-chave: *Acidentes por quedas. Envelhecimento. Envelhecimento saudável. Yoga.*

Introduction

Population aging occurs due to increased longevity, resulting from a decline in mortality and consequently a longer lifespan.[1] Aging is a natural and unavoidable process involving several physiological and immunological changes, as well as limitations in the activities of daily living and restricted mobility and functional capacity caused by intrinsic and extrinsic factors.[2] In addition to sedentary behavior and the presence of uncompensated chronic comorbidities, the process accelerates, directly affecting the quality of life of older adults.[3]

Studies have demonstrated the importance of healthy habits in older people, emphasizing physical activity or mobility as a strategy for better quality of life and delaying physical degeneration.[4] Physical activity is indispensable to physical and mental health, primarily for older persons. World Health Organization recommendations for older people (65 years or older) include aerobic components, muscle strengthening and balance.[5] Although the percentage of elderly that meet these recommendations remains low, several studies have shown the benefits of regular exercise.[5-7] The data show that exercise improves functional status, increases muscle strength and postural stability, and reduces the risk of falls, a common occurrence in this age range. Accidental falls may contribute to greater functional incapacity, causing a decline in autonomy, physical performance and functional independence.[7,8] In addition, functional group exercises are effective in minimizing depressive symptoms and social isolation and enhancing quality of life in older adults.[9]

Among the various physical activities, yoga is one of the most suitable and indicated for the older population due to its form of execution. Yoga is characterized as an easy-to-practice, low-impact, low-to-moderate-intensity exercise that increases independence.[10] The involvement of older adults in yoga provides a number of benefits, such as postural rehabilitation, respiratory awareness, muscle strengthening and relaxation, homeostasis, mental relaxation and emotional improvement, producing effects including the control of chronic diseases.[11]

Studies show that the functional state of older people who practice yoga is 3.27 times greater than that of those who do not.[10,11] Significant improvements were found in muscle strength, agility, static and dynamic balance, all of which contribute to fall prevention.[12] Moreover, these benefits are maintained even when yoga is adapted, such as chair yoga.[12] Age does not impede yoga practice, as observed in a study with older women (average age = 84 years), where yoga improved physical aptitude scores, reduced stress levels and enhanced well-being.[13] Thus, yoga can be a therapeutic resource for this population, since it can be adapted to the individual characteristics of each person, thereby meeting their needs.

In this respect, several studies[1,3,11,12] have included yoga as a preventive therapeutic technique, demonstrating its various benefits for older people, but there is still no consensus on the issue. The aim of this study was to synthesize the existing evidence on the effects of yoga on quality of life and physical-functional capacity that may contribute to preventing falls in older adults.

Methods

This systematic review was conducted according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and Cochrane Collaboration recommendations.[14,15] The protocol is registered at PROSPERO (CRD42020213140).

Search strategy

The following electronic databases were used as research sources: Medical Literature Analysis and Retrieval System Online (Medline/Pubmed), Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), SCOPUS, Web of Science and Physiotherapy Evidence Database (PEDro), with no language or year of publication restrictions. The search was conducted in August 2020 using keywords related to "yoga" and "older adults" along with the Boolean operators AND or OR, as follows:

Medline/PubMed: ((((((Yoga[MeSH Terms]) AND (((Elderly[MeSH Terms]) OR Aged[MeSH Terms]) OR older adult)) AND ((((((((((((physical aptitude) OR physical function) OR personal autonomy[MeSH Terms]) OR healthy aging[MeSH Terms]) OR quality of life[MeSH Terms]) OR welfare) OR well-being) OR mobility) OR functionality) OR gait[MeSH Terms]) OR postural balance[MeSH Terms]) OR accidental falls[MeSH Terms]) OR biorhythm) OR active aging).

LILACS: Ioga/yoga AND; Envelhecimento/Aging; Envelhecimento saudável/ HealthyAging.

SCOPUS: ALL ("Yoga") AND ALL ("Elderly" OR "Aged" OR "older adult") AND ALL ("physical aptitude" OR "physical function" OR "personal autonomy" OR "healthy aging" OR "quality of life" OR "welfare" OR "well-being" OR "mobility" OR "functionality" OR "gait" OR "postural balance" OR "accidental falls" OR "biorhythm" OR "active aging") AND NOT (review).

Web of Science: TS = (Yoga) AND TS = (Elderly OR Aged OR older adult) AND TS = (physical aptitude OR physical function OR personal autonomy OR healthy aging OR quality of life OR welfare OR well-being OR mobility OR functionality OR gait OR postural balance OR accidental falls OR biorhythm OR active aging).

PEDro: "Yoga" and "Elderly".

The articles that met the eligibility criteria were included. Screening was carried out by reading the title and abstract after irrelevant and duplicate studies were excluded. Eligible articles were read in their entirety to select those included in this review. In addition, the refence lists of these articles were examined by two independent reviewers and the relevant studies therein selected for data collection. Any disagreement was resolved by discussion and consensus between them and when necessary, a third reviewer intermediated.

Eligibility criteria

The following inclusion criteria were established:

1 - Participants: community-dwelling older adults (aged 60 years or older) of both sexes or those in long-stay institutions;

2 - Intervention: studies that used yoga as therapy for older people compared to a control group with no exercise intervention, in usual treatment or undergoing health education;

3 - Outcomes: studies that reported the effect of yoga on quality of life, fall prevention or physical function of older people;

4 - Study type: randomized or semi-randomized clinical trial. Excluded were systematic reviews, literature reviews, incomplete articles, incomplete data that preclude replication, studies that used therapeutic interventions associated with yoga or those in which participants were engaged in other regular physical activities before the trial. Disagreements were discussed between the authors responsible for data collection or resolved by a third author.

Data extraction

Pairs of reviewers extracted the data independently using a standard Microsoft Office Excel 2013 form containing the following details: first author's name and year of publication; study design; population description and sample size; control group description; intervention description; description of results and statistical comparisons between groups. Disagreements were resolved by a third reviewer. In case of missing data, the authors were contacted to acquire additional information.

Assessment of methodological quality

Risk of bias was assessed using the Cochrane risk-of-bias tool.[15] The following domains were evaluated:

random sequence generation (selection bias); allocation concealment (selection bias); participant and personal blinding (performance bias); masking of result assessment (detection bias); incomplete data results (attrition bias); selective result reports (reporting bias); and other biases. Each of these domains contain questions related to the study design, with the responses "yes", indicating low risk of bias; "no", for high risk of bias; and "confused", if incomplete details were reported to adequately assess risk of bias. This process was conducted independently by two researchers and discrepancies resolved after discussion between them or by a third author. The Review Manager Software Package 5.3 (RevMan v.5.3) was used to create the figure and risk of bias graph of the studies included.

Results

The database search identified 1,187 articles, and three more in the references of the studies included, for a total of 1,190 articles. Of these, 1,129 were excluded according to the criteria of eligibility and duplication, leaving 61 eligible articles for complete reading. Eighteen of these were included in the present review, as presented in Figure 1.

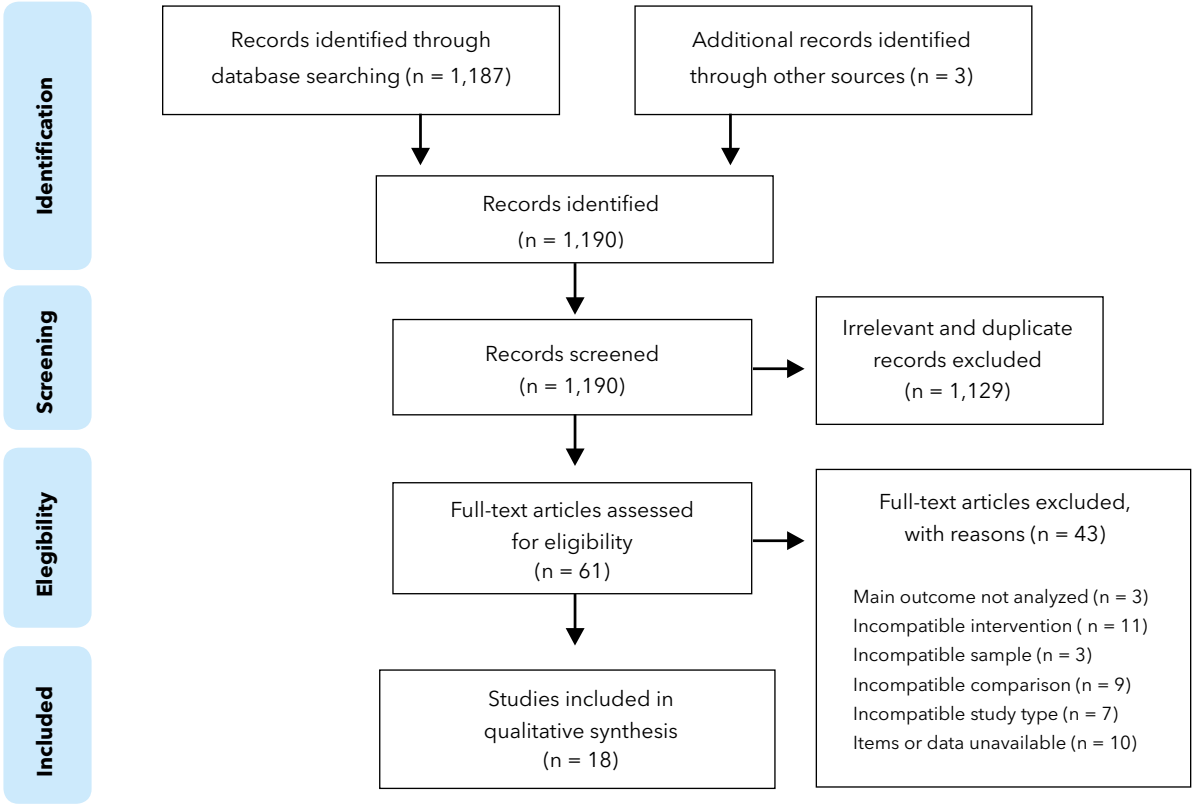

Figure 1 - PRISMA flowchart of the study selection process.

Study characteristics

The characteristics of individual studies are described in Table 1. Included were studies with 16 to 20 participants of both sexes, aged between 62 and 85 years, but some involved only wome[16] or men.[17] The comorbidities exhibited by the older subjects were different and frequently included osteoarthritis,[18-20] hypertension[17] and thoracic hyperkyphosis,[21] as well as healthy individuals.[21,22] TAll the studies included community-dwelling older people, except one that assessed long-stay institutions.[16]

Table 1 - Study characteristics

Author (year)	Study design	Sample	Intervention	Outcomes
Furtado et al., 2016[13]	Randomized control trial	35 healthy women randomly allocated to a control or intervention group. CG (n = 15) IG (n = 20)	CG: continued performing their normal activities. IG: performed hatha yoga asanas (breathing) with a focus on flexibility.	The IG maintained cortisol and alpha-amylase levels, protecting themselves against stress and infection - SPSS 20.0 (p = 0.004). The CG exhibited less fear of falling (-46%) than the IG (-36%) (p = 0.001).
Marques et al., 2017[16]	Pilot randomized control trial	34 women (age: 83.16 ± 7.4 years) IG (n = 15) CG (n = 10)	CG: no exercise. IG: Chair yoga two or three times a week, for 28 weeks.	Chair yoga improved emotional well-being in the WHO-5 (p = 0.055) and back stretch flexibility (p = 0.03).
Patil et al., 2017[17]	Randomized control trial	60 older adults (≥ 60 years) with an increase in PA > 60 mmHg. CG (n = 30) IG (n = 30)	CG: stretching exercises, such as neck, shoulder, hip, wrist and ankle rotation, forward and lateral flexion and walking. IG: relaxation exercises, asanas (maintain poses), pranayama (breathing exercises) and cyclic meditation. Asanas were practiced for 15-20 min, and pranayama and relaxation techniques/meditation for 40-45 min.	The IG showed a reduced heart rate (p = 0.03), shorter ventricular ejection duration (p = 0.01) and improved diastolic function (p = 0.017), all using Peri-scope, Genesis Medical Systems, India.
Cheung et al., 2017[18]	Pilot randomized control trial	83 older adults with symptomatic OA of the knee (> 60 years old). CG (n = 23) IG (n = 32) IG (n = 28	CG: the control group received an OA educational brochure and weekly telephone calls from the study team. IG: underwent the hatha yoga (HY) program with one weekly group session and four weekly home-based sessions for eight weeks. IG: low-impact aerobic and muscle strengthening exercises (ASE) consisting of one weekly group exercise, and home-based sessions (strengthening exercises twice a week and aerobic exercises four times a week), also for eight weeks.	The IG (Hatha yoga) showed a significant improvement in OA symptoms according to WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index) (p =0.001), reduced anxiety (p = 0.04) and less fear of falling (p = 0.002), both observed by the Short Physical Performance Battery (SPPB).
Cheung et al., 2014[19]	Pilot randomized control trial	36 older adults (average age = 72 years) CG (n = 18) IG (n = 18)	CG: the waiting list control group received the same yoga intervention after the IG at the end of eight weeks. IG: yoga program consisting of one weekly hatha yoga class for eight weeks, involving group and home-based exercises.	The IG obtained higher pain (p = 0.01) and stiffness scores (p = 0.002), and improved control in the repeated chair stand subscale of the SPPB (p = 0,03).
Park et al., 2016[20]	Pilot randomized control trial	112 participants with OA (≥ 65 years) CG (n = 49) IG (n = 63)	CG: linguistically adapted health education program (HEP). IG: chair yoga, two classes a week for 45 minutes for eight weeks.	The IG showed a decline in pain on the WOMAC (p= 0.01), rise in gait speed on the Gait Speed Test (p = 0.02) and less fatigue on the PROMIS – fatigue V (p = 0.03).
Greendale et al., 2009[21]	Pilot randomized control trial	118 older adults of both sexes (> 60 years). CG (n = 60) IG (n = 58)	CG: activities consisting of lunches, monthly seminars and correspondence, with 2 hours per session for 24 weeks. IG: 1-hr yoga classes, three days a week for 24 weeks.	The IG obtained a decline in the kyphosis angle observed using the flexicurve instrument (p = 0.06).
Flegal et al.,2007[22]	Randomized control trial	91 generally healthy men and women generally aged 65-85 years, randomized for a 6-month intervention. CG (n = 47) IG (n = 44)	CG: walking on an outdoor track, with weekly 60-minute classes. IG: weekly 90-minute iyengar hatha yoga classes + a booklet illustrating the specific poses to help independent practice.	The IG showed a reduction in anxiety in the State- Trait Anxiety Inventory (STAI) (p = 0.04) and enhanced physical functions observed in seated forward bend, one legged-standing (p = < 0.05), increase in vitality on the SF-36 (p = 0.04) and less fatigue on the MFI-20 (p = 0.04).
Kaminsky et al., 2017[23]	Randomized control trial	46 participants with a history of COPD, aged 60 years or older, with study duration of 12 months. CG (n = 22) IG (n=21)	CG: continued with their habitual activities. IG: coordinators taught pranayama yoga, then the dirgha method, a three-part deep breathing technique.	The IG showed improved mobility in the 6-min walking test (p = 0.04).
Nick et al., 2016[24]	Randomized control trial	39 older adults of both sexes (age: 68 ± 4.8 years) CG (n = 19) IG (n = 20)	CG: no intervention. IG: hatha yoga with emphasis on pavanamuktasana, balance movements, and savasana. 1 hour, twice a week for eight weeks.	IG participants improved their balance in the BBS (p < 0.0001) and decreased their fear of falling on the MFES (p < 0.0001).
Ni et al., 2014[25]	Randomized control trial	39 older adults of both sexes (> 60 years old). CG (n = 11) CG (n = 15) IG (n = 13)	CG: Tai Chi in 60-min sessions twice a week for 12 weeks. CG: standard balance training twice a week (session duration: 60 min) for 12 weeks. IG: yoga, twice a week 60-min sessions for 12 weeks.	All groups had significant improvements, analyzed by field tests: 8UG, OLS and right and left FR, normal and maximum speed walking, in standard balance and in gait (p < 0.005). Reduction of postural instability was also observed in laboratory tests that evaluated postural oscillation with eyes open (p = 0.001) and eyes closed (p = 0.002) with a consequent relevant improvement in dynamic posturography (p < 0.001).
Park et al., 2017[26]	Randomized control trial	100 participants with OA (≥ 65 years old) CG (n = 48) IG (n = 52)	CG: linguistically adapted health education program (HEP). IG: linguistically adapted chair yoga (CY) program (versions in English and Spanish). Both groups attended two classes a week (45 min each) for eight weeks.	In both groups, the WOMAC indicated a decline in OA symptoms (p < 0.001), and the random effects model of depression (p < 0.001) and social activity practice (p < 0.001) showed significant improvement. However, balance showed no relevant difference according to the aforementioned model (p > 0.05).
Hariprasad et al., 2013[27]	Randomized control trial	6-month study of 87 individuals 60 years of age and older. CG (n = 58) IG (n = 62)	CG: no intervention during the study period. IG: daily supervised sessions for one month; participants were then encouraged to continue unsupervised. The yoga program consisted of yogāsana, (loosening practices), sukñmavyayāma (physical poses), prāëäyāma (breathing exercises) and nādānusandhāna (meditation on the sound).	The IG improved visual, verbal and working memory through RAVLT(p = <0.000) as well as attention, executive and psychomotor function, assessed by COWA (p = <0.013).
Gothe et al., 2014[28]	Randomized control trial	118 older adults (average age of 62.0 years) CG (n = 57) IG (n = 61)	CG: stretching and strengthening exercises. IG: yoga as intervention. Both groups participated in 1-hr exercise classes, three times a week for eight weeks.	When compared to the CG, the IG showed an improvement in executive function in the task switching version (p = 0.04), in running memory span (p = 0.11) and working memory, the last observed in the N-Back Task (p = 0.003).
Hariprasad et al., 2013[29]	Randomized control trial	120 older adults (> 60 years old) CG (n = 58) IG (n = 62)	CG: no intervention. IG: daily yoga for one month and weekly for up to three months; they were also encouraged to practice unsupervised yoga for six months.	The IG improved quality of life, observed in the short version of the World Health Organization Quality of Life questionnaire (WHOQOL-BREF) (p < 0.05); and sleep quality in the Pittsburg Sleep Quality Index (PSQI) (p = 0.384).
Tew et al., 2017[30]	Pilot randomized control trial	47 older adults of both sexes (90% women; average age of 74.8 years). CG (n = 26) IG (n = 21)	CG: educational booklet on physical activity. IG: educational booklet on physical activity + 10 sessions of yoga over 12 weeks (yoga adapted to the elderly).	The IG improved physical performance, observed in the SPPB (p = 0.009), sit-to-stand (p = 0.009) and back scratch (p = 0.059), better self-reported health status in the EQ-5D-5L measure (p < 0.05) and mental well-being in WEMWBS (p < 0.05) in three months of yoga.
Zettergren et al., 2011[31]	Pilot study	16 older adults (both sexes, age 84 ± 4.6 years). CG (n = 5 women and 3 men) IG (n = 8 women)	CG: no intervention. IG: an 80-min class of kripal yoga, every two weeks for eight weeks.	The IG improved postural control according to the Berg Scale (p = 0.0003), mobility and gait speed, as determined in the Timed Up and Go.
Santaella et. al, 2015[32]	Randomized control trial	29 healthy individuals 60 years and older. CG (n =14) IG (n =15)	CG: stretching activities in any part of the body. IG: forced inspiration and expiration breathing exercises (Bhastrika).	The IG showed improvement in MIP and MEP according to the Koko spirometer (p = 0.0001).

Note: CG = control group; IG = intervention group; OA = osteoarthritis; COPD = chronic obstructive pulmonary disease; WOMAC = McMaster Universities Osteoarthritis Index; SPPB = Short Physical Performance Battery; SF-36 = Health-Related Quality of Life; MFI-20 = Multidimensional Fatigue Inventory; SPSS = Statistical Package for Social Sciences; RAVLT = Rey's Auditory Verbal Learning Test; COWA = Controlled Oral Word Association; WHOQOL = Measuring Quality of Life of World Health Organization; PSQI = Pittsburgh Sleep Quality Index; WHO-5 = World Health Organization; BBS = Berg Balance Scale; MFES = Modified Falls Efficacy Scale; PROMIS = Patient Reported Outcome Measurement System; EQ-5D-5L- EuroQol; WEMWBS = Warwick-Edinburgh Mental Well-being Scale; EQ-VAS = EuroQol Visual Analogue Scale. HY = Hatha yoga; CY = Chair yoga; 8UG = 8-Foot Up and Go; ASE = Aerobic/Strengthening Exercises; HEP = Health Education Program; STAI = State and Trait Anxiety; OLS = One Leg Stance.

The yoga intervention protocol was applied between 8 and 28 weeks. Different types were used, highlighting Hatha yoga,[18,19,22,25] Yengar yoga[22] and Chair yoga.[16,20,26] As expected, pranayama[17,23,26] and dasasanas[3,17,21] were frequent among the different yoga modalities. With respect to sessions, most of the cases were weekly, alternating between two and three weeks.[16,20,21,24,26,28] However, one study performed them once a day for a month.[29] The authors decided to conduct assessments before and after the intervention period and supervised at other times during this period.[16,22,25,27,29]

A summary of the protocols used in the studies based on the main yoga modalities is presented in Table 2.

Table 2 - Summary of yoga protocols based on their main modalities

Yoga modality	Frequency/time	Additional accessories	Main yoga poses
Hatha yoga[18,19,25]	An average of 1 or 2 60-min sessions a week for 8 weeks	Yoga mat, blocks, strap, blankets and chair	Mountain pose, warrior pose I and II, tree pose, chair pose, easy pose, bound angle pose, and resting pose.
Iyengar yoga[22]	Weekly 90-min sessions for 6 months	Straps, blocks, cushions, pillows and chairs	Mountain pose with arm stretching, chair pose, tree posture, half-moon pose, triangle pose, warrior poses I, II, III.
Chair yoga[16,20,26]	An average of two 45-min sessions per week for 16 weeks	Chair	Breath of life, suitable body, warrior poses and mind-body connection.

Main results

Quality of life

Quality of life was assessed specifically using the World Health Organization Quality of Life (WHOQOL) – BREF questionnaire, in which improvement was obtained after yoga intervention.[29] The studies also observed better emotional well-being in the WHO-5,[16] mental well-being,[30] visual, working and verbal memory,[27] as well as reduced anxiety[22] and fear of falling.[19]

Physical-functional capacity and prevention of accidental falls

Studies that applied yoga as an intervention tool exhibited improved balance, mobility, gait and postural control. Two studies assessed balance and postural control using the Berg Balance Scale (BBS), achieving favorable results.[25,31] One study revealed physical performance benefits, assessed by the Short Physical Performance Battery (SPPB), Sit-To-Stand Test and the Back Scratch Test.[30] Mobility and gait speed improved, as evaluated by the Timed Up and Go test.[31]

Risk of bias

The methodology of the studies was assessed using the Cochrane risk-of-bias tool.[15] Of the 18 studies included in this review, five did not randomize correctly or describe their process[3,22,24,28,31] and many did not use allocation concealment, participant or outcome assessment blinding.[17,21-25,27-32] Incomplete results or selective outcome reporting and other biases were not found in any of the studies included. These data are presented in Figure 2, which shows a synthesis of individual articles, and Figure 3, a risk of bias graph that demonstrates the risk of bias of the studies included in percentage.

Discussion

The present systematic review showed the benefits of yoga for older adults. The studies demonstrated improvement in quality of life, analyzed via emotional well-being, reduced anxiety and a decline in stress. In addition, benefits for physicofunctional capacity and consequent fall prevention were related to decreased muscle fatigue and pain, enhanced gait performance, balance, attention, executive and psychomotor function.

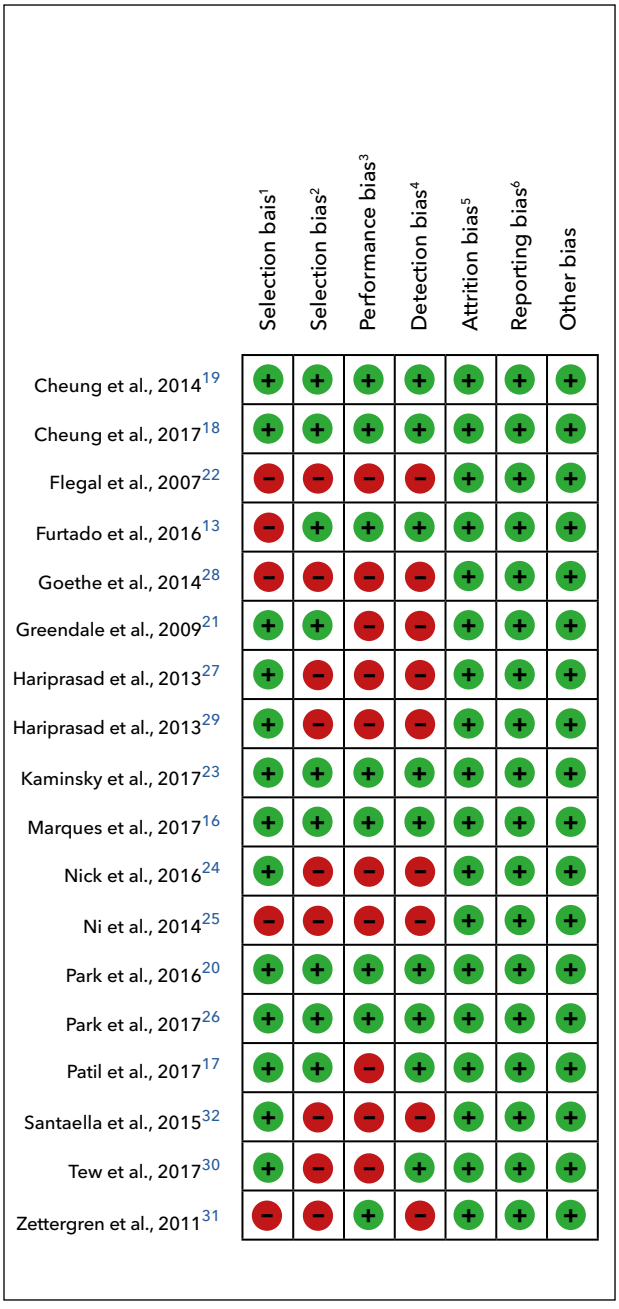

Figure 2 - Summary of the risk of bias of the studies included, according to the authors' judgements of each risk of bias item for each article included.

Note: [1]Random sequence generation; [2]Allocation concealment; [3]Blinding of participants and personnel; [4]Blinding of outcome assessment; [5]Incomplete outcome data; [6]Selective reporting.

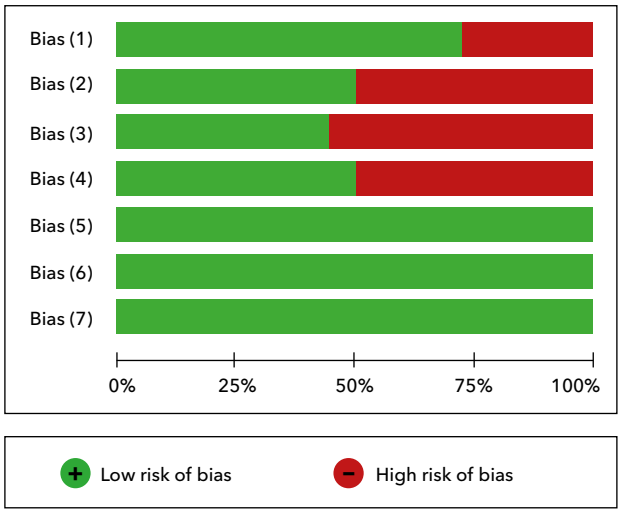

Figure 3 - Risk of bias graph: analysis of the authors' judgements on each risk of bias item, presented as percentages in all the studies included.

Note: (1) Random sequence generation (selection bias); (2) Allocation concealment (selection bias); (3) Blinding of participants and personnel (performance bias); (4) Blinding of outcome assessment (detection bias); (5) Incomplete outcome data (attrition bias); (6) Selective reporting (reporting bias); (7) Other bias.

When older adults have a sedentary lifestyle, yoga provides them with a daily activity and an excellent hobby. Older people feel more active and independent with daily yoga practice, given that it is a way to improve focus, quality of life, sleep quality, executive and psychomotor function.[27,29] Among institutionalized older adults, yoga twice or three times a week improved emotional well-being, since individuals who live in long-stay institutions are more socially inactive and debilitated than their community-dwelling counterparts.[16,33] Intervention, therefore, has numerous physical and psychological benefits.

Studies reveal that holistic practices such as yoga, and concomitantly meditation, contribute to enhancing perceived psychological well-being and quality of life, as observed in the present review.[16,20,26,27,29] AlIn addition to the repercussions for physical and mental wellness related to emotional and self-care aspects, yoga had a positive influence on mood states, including depression, stress and fatigue, resulting in more vigor and less irritability in older adults.[22] In addition, given that stress influences health maintenance and quality of

life, physical activity and yoga are effective at improving cognitive status and emotional balance, reducing psychophysical apathy and the physical and emotional symptoms of stress, as well as increasing assertiveness, and affectivity and self-control of anxiety.[3]

As an ancient technique disseminated around the world, yoga is based on performing harmonic conscious body movements in order to maintain proprioceptive and respiratory control in the individual, and shows great potential in contributing to several physiological systems, such as the visual,[27] in addition to enabling an increase or stabilization of physical function, reducing falls and the fear of falling in older persons. Yoga contributes to recovering musculoskeletal disorders that interfere in the independence of older adults,[34] and improves muscle fatigue,[22] musculoskeletal pain,[19,20,26] and static and dynamic balance.[20,26]

Yoga enhances postural balance by increasing flexibility, strength, hip range of motion and stride length, in addition to decreasing anterior pelvic tilt, variables that are important in postural control and its reflexes.[1] The osteomyoarticular outcomes obtained corroborated the reduced fear of falling observed in two studies.[18,25] When practiced regularly, the resulting benefits of this intervention help decrease immobilization and isolation, leading older adults to a feeling of personal fulfillment.

Yoga clearly has a direct and indirect positive influence on the quality of life of older persons in terms of psychological and physical health, given that it is capable of maintaining and increasing mobility and resistance at different moments, contributing to the functional autonomy of these individuals during their activities of daily living.[10,13,22,28] However, the benefits of this exercise modality is not only limited to these areas. One study confirmed that practicing yoga for three months significantly improves diastolic function, thereby strengthening cardiac capacity.[17] In another article, yoga intervention improved working memory (task execution), demonstrating that outcomes such as these also influence the overall well-being of older people.[28]

However, more studies are needed on this issue, since some approaches limit the results obtained. In the present review, the studies included were heterogeneous, from the discrepancy among the intervention protocols to the outcome assessment methods. For this reason, a descriptive synthesis was conducted, since statistical data analysis was not possible. The studies do not describe how long the effects of yoga lasted, that is, the long-term benefits remain unknown. The cost-effectiveness and yoga safety protocols adopted in the studies also require further elucidation. In addition, there is a need to know the repercussions of yoga for older adults living in long-stay institutions (LSIs), since the studies included in this review involve primarily community-dwelling individuals, considering the limited evidence regarding the benefits for this population.

The evidence quality of the studies was moderate. Some articles did not conduct proper randomization and blinding, which may have influenced the accuracy of their results. Some did not describe the randomization process, which might have caused selection bias. Moreover, information bias may also be present in studies that did not blind participants. On the other hand, this could be explained by the form of yoga intervention, which hinders blinding, given that specific body activities are used that preclude effectively forming a placebo group, which is a further limitation of the studies. Nevertheless, the present review demonstrated that yoga improves quality of life and physical function, thereby contributing to preventing falls in older adults.

Conclusion

As such, the regular practice of different yoga modalities produces significant benefits for the older population, indicating an improvement in quality of life and physical-functional capacity, favoring fall prevention. However, the evidence remains limited and we suggest new studies on older persons living in long-stay institutions and that the long-term effects of yoga intervention be monitored to better understand its benefits as a therapeutic resource.

Authors' contributions

DFS, MERAS, TSC and MECM wrote the manuscript, participated in establishing eligibility criteria and standardizing the data collection forms. TSC, MECM and SCP analyzed and interpreted the data. DFS and MERAS conducted database searches and bias risk analysis of the studies, SCP being the third reviewer. SCP and IPDMAA contributed with their experience to the intellectual content and guidance. All the authors reviewed and approved the final version.

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