

A Review on Preventive Interventions for Elderly Fall Problems related to Balance

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Abstract: Fall can reduce older adults' ability to live an independent, safe, and healthy life. Falls may become fatal if it remains unnoticed in time. Fall risk factors are mainly classified as 'intrinsic' and 'extrinsic'. Among 'intrinsic' risk factors it is found that muscle weakness and problems with gait and balance in elderly population are the major risk factors for fall. Increasing physical activity is considered as an effective component of fall prevention programs. It can improve strength, balance, and coordination can reduce the risk for falls. So this study attempts to give a systematic review on fall risk factors and interventions related to muscle strengthening. It includes group sessions trained-balance and strength-exercise training and exercise programs like yoga, tai- chi for the elderly people. Such individual management, balance strength exercises are cost effective, and these will improve social participation, which eventually may reduce isolation and loneliness in elderly. But these interventions need long term practice for better results so awareness among elderly and their family members is needed.

Introduction

Fall is one of the most common geriatric syndromes threatening the independence of elderly population and a serious public health problem which has an extensive impact on family, society, and health and healthcare costs [25]. Globally, unintentional fall is one of the most costly and complex health issues faced by the aging population [23]. It is considered as the leading cause of injury, deaths and disabilities among aging population (above 65 years) [24]. 20% of elderly loses their mobility due to fall and 30% of them lose independence [9]. Interventions to reduce fall problems become an essential issue to consider with population ageing which is an emerging demographic trend of the twenty-first century. Various preventive intervention programmes based on reported fall risk factors have been established. The problems can be avoided by either taking precautions, being aware of safety behaviour, keeping strong the lower body muscle specially with the help of physical activities, exercise etc. and modifying architecture; with the help of technology assistance so that elderly can get immediate attention if they fall. For performing balance related intervention elderly and their family don't need to do any environmental changes and don't have to invest lots of money. For that purpose this study tried to summarise the effectiveness of balance related interventions to reduce falls incidence in elderly so that they can live independently.

Methodology

An extensive research on publications was conducted to ensure the inclusion of as



many relevant records and studies that have described the major incidence of elderly falls and balance related fall interventions. Searches on multiple electronic databases, internet searches, as well as manual checks are done published in English language in abstract and full- text form. Fall among age group of 60 years and above are considered for this paper. It is reported that elderly with no other physical impairment or disability fell maximum that is 51.9% of fall over years [13] so in this paper disability related fall are also excluded. Information regarding architectural changes and technology assessment are not under the purview of this study as only balance related personal management studies are included here.

Results

The outcome of this review is to see number of preventive intervention related to behavior, muscle balance related exercise or physical activity. Broadly the factors causing fall are classified as intrinsic (pathological disease states and medications) and extrinsic (environmental hazards) factors [1-12]. Among elderly population the most important risk factors for fall are muscle weakness and problems with gait and balance [7,8]. Some intrinsic risk factors such as impaired neuromuscular function can be modified by different muscle strengthening and balance retraining programs so that it can improve flexibility, leg strength, and balance like Tai Chi are effective interventions for fall prevention [13, 16, 21]. It exercises can be performed in community leisure centers (that have rooms for exercise classes) and home were performed in participants' homes. Such types of studies found in literature are listed in the table1.

Table 1 Description of studies found in literature

Sl. No.	Aim	Study Done	Country	Mode of Intervention	Study Design, Participants	Outcomes
1	To improve balance and physical performance of older adults	Li, et al. [14]	Portland, Oregon, United State	Tai Chi classes	Participants=195 Age: 75 years and older 6-month program of Tai Chi classes with a program of stretching exercises	Risk of falling decreased by 55%
2	To keep the workplace safe	Occupational Safety and Health Administration, 2007 [4]	_____	Recommendation	_____	Walking speed: Should not be too fast. Gait: To point the toes slightly to the sides, walking like a penguin with a short stride.

3	To reduce risky behaviours and to improve physical fitness through exercise	Hornbrook, et al. [14]	Portland, Oregon, and Vancouver, Washington, United States	Exercise Intervention and safe health behaviour	Participants: 3,182 (about 60 % female) Age: 65 years or above Home visit	Male participants showed the greatest benefit. Fall rate reduced by 15%
4	For gait, balance and mobility improvement for elderly staying in a home	Krishnamurthy et. al., 2007 [18]	India	Yoga and a poly-herbal Ayurveda preparation	Participants: 69 Age:60-95 years Yoga session was for 75 minutes daily, for 6 days a week. And Ayurveda group received a poly-herbal preparation (Rasayana Kalpa: 'rejuvenating tonic')	Yoga practice improved the joint mobility in rheumatoid arthritis patients but they also mentioned that the changes in the Ayurveda group could be related to improved muscle strength and better sensory perception as it is hypothesized in traditional Ayurveda texts.
5	To give a review on the topic: accidental injury caused due to fall in geriatric population	Alok Kumar et. al., 2011[9]	India	Guidelines for Physical Exercises	Review Based 14 papers (1977-1991)	Walking is most applicable aerobic exercise and before aerobic body should be warm up for 10-15 minutes. Water exercises are best allowing movement with low impact on diseased joints & bones.
6	Group sessions of moderate-intensity exercise to improve balance and coordination, muscle strength, reaction time, and aerobic capacity	Barnett, Et. al., 2003 [26]	South-west Sydney, Australia	Group exercise to improve balance	Participants: 165 Age: 65 years and above Total of 37, 1-hr. classes. Once a week over a 1-year period	Within the 12-month trial period, the rate of falls in the intervention group was 40% lower than that of the control group



7	To increase strength and endurance and improve mobility and balance using a low- to moderate-intensity group exercise program	Rubenstein, et al., 2000 [27]	Los Angeles, California, United States	Group exercise program	Participants: 59 Age: 70 years and above Control group (n=28) and experimental group ((n= 31) 12-week group exercise program) 90 minutes, three times per week	A simple program of progressive resistance exercises, walking, and balance training can improve functional mobility and study also shows new evidence on the complex relationship between physical activity and falls
8	To see the effectiveness of home-based exercise intervention designed to improve dynamic balance and core and leg strength	Skelton, et al., 2006 [28]	London, United Kingdom	Falls Management Exercise (FaME) Intervention	Participants: 81 women Age: 65 years and above Exercise group (50 women) and control group (31 women)	Fall rate reduced by 54%
9	To study the effectiveness of a community-based Tai Chi program to reduce falls among elderly	Voukela-tos, et al., 2007 [29]	Sydney, Australia	Tai Chi Trial	Participants: 702 Age: 60 years and above Sixteen-week program of community based tai chi classes of 1 hour duration per week	Falls seen less frequent in the tai chi group than in the control group

DISCUSSIONS

It has been found that structured intervention has reduced the future fall risk by 70 % [7]. Implementation of the interventions has their own advantages and disadvantages. Training programs and exercises like yoga, tai- chi are mainly for muscle strengthening purpose. These interventions give benefits but these need long term practice for good results. If we consider Indian context elderly might be reluctant to do it. In Indian scenario changing socio- economic and socio- cultural condition is leading Indian elderly to live alone. Besides these issues, low literacy, poor infrastructure, and limited access to health care are the main reasons for the elderly people being left abandoned. In both cases there is a need to improve physically fitness, and muscle strength to minimise imbalance and the risk of fall. Individual management, balance strength exercises are cost effective but awareness among elderly and their family members is needed. In Indian context such group activity, exercises will improve the physical fitness as well as will improve social-ization, which

eventually may reduce isolation and loneliness in elderly. Isolation and depression triggered by lack of social participation increase fear of falling, and vice versa. Providing social support and opportunities for older people to participate in social activities to maintain the active interaction with others may decrease their risk of falls.

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