International Journal of Research and Review
Volume 11; Issue: 12; December 2024
Website: www.ijrrjournal.com
Review Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Do Chair Based Exercises Help in Improving Balance, Physical Fitness, and Quality of Life in Various Populations? A Systematic Review

Dr. Shweta Dixit, PT[1], Dr. Mansi Patel, PT[2], Dr. Bharat Tiwari, PT[3]

[1]MPT Student (Cardio-Pulmonary Sciences), IKDRC-ITS, College of Physiotherapy Civil Hospital Campus, Asarwa, Ahmedabad, Gujarat India
[2]Lecturer, IKDRC-ITS, College of Physiotherapy Civil Hospital Campus, Asarwa, Ahmedabad, Gujarat India
[3]I/C Principal and Senior Lecturer, IKDRC-ITS, College of Physiotherapy Civil Hospital Campus, Asarwa, Ahmedabad, Gujarat India
Gujarat University of Transplant Sciences, Ahmedabad India

Corresponding Author: Dr. Shweta Dixit [PT]

DOI: https://doi.org/10.52403/ijrr.20241249

ABSTRACT

Background: Due to different medical conditions as well as aging and sedentary lifestyle we have a population living with balance problems, reduced physical function and, poor quality of life. Chair-based exercises are exercises performed while sitting in a chair, which include upper and lower body movements led by an instructor while listening to music and sitting in a straight-back chair. Chair-based exercises have specific benefits as a training method as they stabilize the lower spine by providing a fixed base, and facilitate a greater range of movement by providing points of leverage and support; it minimizes load-bearing and reduces balance requirements in those with particular poor mobility and balance.

Purpose: To summarize the current evidence on the effect of chair-based exercise on balance, physical fitness and, quality of life in different populations.

Methodology: English literatures about CBE published between 2017 – 2024, was systematically searched on Google scholar, PubMed, Research gate and Cochrane. Only RCTs (PEDRO>5) were included in which chair-based exercises was an intervention. Improvement in balance, strength and, exercise tolerance was reviewed as per PRISMA guidelines.

Result: 8 studies met inclusion criteria. Studies included different sample size (30-100), age (40-80) and different study populations (Psychiatric disorders, older individuals, Premenopausal women, Sedentary individuals) with protocol applied for 3 times/week for 8 to 16 weeks. Overall Chair-based exercises appear to be feasible and safe in improving Balance (Tinetti test), coordination (finger-to-nose test), strength (HHD& portable strength dynamometer), exercise capacity(6MWT) and, quality of life (SF-36).

Conclusion: Chair based exercises are simple, effective and easily implemented activities to improve balance, muscle strength, exercise tolerance and, Quality of Life in various populations who has poor mobility and balance.

Keywords: chair-based exercise, balance, Quality of life, exercise tolerance, strength.

INTRODUCTION

Biological aging along with medical diseases leads to physical inactivity and reduced participation in organized exercise

programs that lead to a decline in cardiovascular and neuromuscular function, contributing to physical frailty and deterioration in physical, mental, cognitive and social changes, which influence the health-related quality of life. [6] World Health Organization (WHO) defines HRQOL as a perfect physical, mental and social health well-being that is affected by different daily behaviour. Such as-

1. Reduced physical activity and acquiring other unhealthy behaviour (smoking, alcohol consumption and, unhealthy eating habits) are considered important risk factors related to the development of chronic diseases (obesity, hypertension, cardiovascular disease, diabetes, etc.)
2. Reduction in independent living
3. Deterioration of HRQOL due to any disease.
4. Decrease of life expectancy in middle age and older individuals. [1-2]

The current recommendation of WHO and ACSM for regular physical activity and exercise to improve or maintain physical and mental health in many middle age and older individuals, but they have not adapted due to their physically inactive lifestyle. [2-3] Key factors for reduced involvement of the population in exercise activities are low availableness, accessibility of guarded exercise programs, and training according to individuals' possibilities. High cost, and time constraints are also considered the main factors. [5-6] Taking all the above rumination, several organizations all over the world suggest, design and implementation of suitable exercise programs for untrained middle-aged, and older individuals using safe, cheap, easily applicable and accessible training means. [1-3]

For this reason, since last years, a chair has been used as training means for implementing various program (flexibility, balance, strength and aerobic capacity) in different population (healthy older individual, young and middle age employed, individual with chronic disease or mobility difficulties, pregnant woman and untrained individual) and have several advantages.

First of all, the use of chair offers better stability, support of the human body, and safety to trainees which minimizes the risk of falls and injuries during exercise. Other advantages of chairs are their low cost and easy accessibility. [3-4] Furthermore, chair-based exercises are feasible and easy to implement in any outdoor and indoor place such as in the Gym, at home, work place, class room, courtyard, park, rehabilitation center, or hospital room.[4]

Due to distinct medical conditions as well as ageing and sedentary lifestyle, we have a population living with balance problems, reduced physical functions, and poor quality of life. Chair-based exercises are performed while seated in the chair, which incorporates upper and lower body movements conducted by the demonstrator while hearing music and sitting in the straight back chair [1-3]. Chair-based exercises have specific benefits, as its steady lower spine provides a fixed base that assists people in retaining or increasing their independence and mobility, and makes possible for a greater range of movement by contributing points of leverage and support, it also minimizes load bearing and reduces balance problems for those who have poor mobility [12].

NEED OF STUDY: As there are very less literatures available on the effect of chair-based exercise. This review will help in compiling all the available literatures which can be used as a reference for future studies.

MATERIALS & METHODS

This systematic review was performed according to PRISMA guidelines. Three reviewers reviewed the title, abstracts, and full-text and also screened for study inclusion Literature search was done on PubMed, EMBASE, Scopus, PEDRO, Google Scholar, and Research Gate by using the keywords: "chair-based exercise, balance, Quality of life, exercise tolerance, strength".

METHODOLOGY

➢ **SEARCH ENGINES:**

- Google scholar, PubMed, Pedro, Research gate and Cochrane.

➢ **KEYWORDS:**

- Chair aerobics, Balance, Quality of life, Exercise tolerance, Strength and Physical Fitness.

➢ **INCLUSION CRITERIA:**

- Only RCTS with chair-based exercise intervention were included
- PEDRO ≥5
- Articles were selected from **year 2017 to 2024.**

➢ **EXCLUSION CRITERIA:**

- Observational studies, only abstracts, single case reports, and systematic reviews were excluded.

➢ **QUALITY OF STUDIES:**

- Analyzed based on Pedro scale.
- **The present study includes: 08 RCT.**

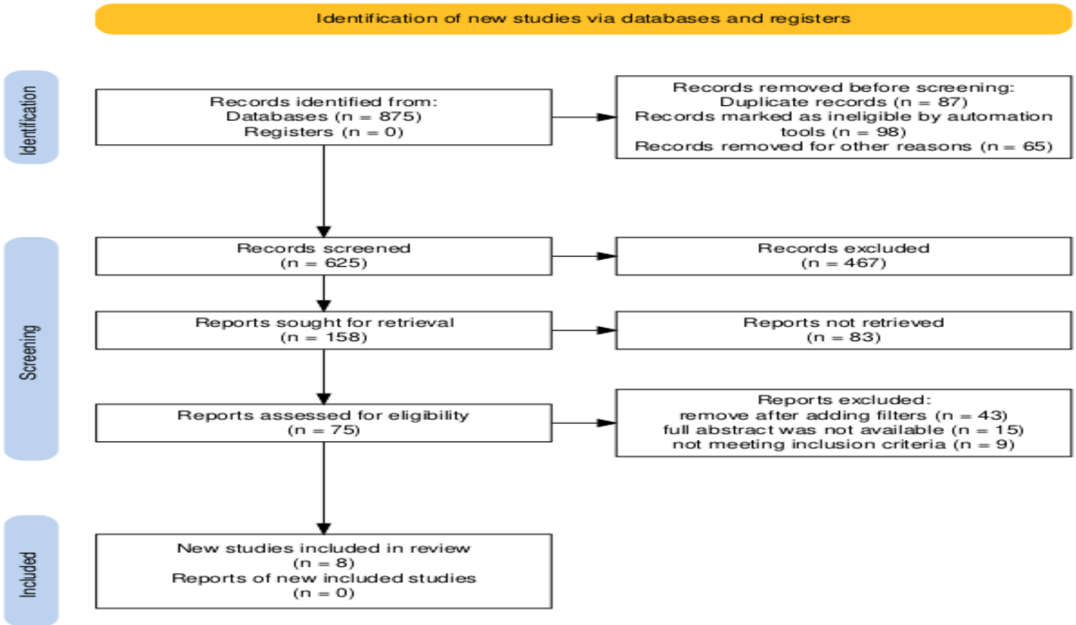

Figure 1: PRISMA Flowchart summarizing the selection process.

TITTLE	JOURNAL NAME/ AUTHOR	INTERVENTION	OUTCOME MEASURE	SAMPLE SIZE	PEDRO SCORE	CONCLUSION
Effect of three different chair based exercise programs on people over 80 years old .	Rejuvenation research (2017)/ Jose M cancela carral et al	Chair aerobics	Hand held dynamometer, Tinetti gait balance ,Barthal index ,Time up and go test	50	6/10	The elastic band program in chair based exercise result in significant improvement in **strength and balance** among elder populations.
Effect of chair yoga therapy on physical fitness in patients with psychiatric disorder –A 12 week single blind randomized controlled trial .	Journal of psychiatric research / Saeko ikai et al.	Chair yoga therapy	Modified fall efficacy scale ,hand held dynamometer , quality of life questionnaire	56	7/10	The result indicated sustainable effect of 20 minute 12 week 24 session chair yoga therapy **on physical fitness and also reduce the risk of fall** and their unwanted consequences in psychiatric patients.
Effectiveness of chair aerobics and Frenkel's exercise in geriatric population on balance and coordination – randomize clinical trail.	International neurology journal/ Ms. k Arundhati Shiv prasad et al	chair aerobics ,Frenkel's exercise	Romberg test and finger to nose test .	30	6/10	Chair aerobics and Frenkel's exercise is found to be effective **on balance** and **coordination** in geriatric population .
A chair-based music-kinetic combined exercise program as an alternative approach for increasing health, function capacity and physical fitness indices in middle aged pre menopausal women .	Journal of functional morphology and kinesiology/ Konstantina karatrantou et al.	Chair based exercise : aerobics exercise ,strength exercise ,balance exercise .	1 min single limb stance , time up and go test hand held dynamometer up test ,submaximal treadmill walking test ,sit & reach test.	40	6/10	Chair based combined music kinetic exercise was effective and increase **functional capacity ,balance ,physical fitness** in middle aged woman .
Outcome of chair aerobics' and pranayama on anxiety and exercise tolerance in coronary artery by pass grafting patients: study protocol of a randomized clinical trial	International journal of surgery protocols / Abeeshna Ashok et al .	Chair aerobics and pranayama.	6 minute walk test ,hospital anxiety depression scale , heart rate .	36	8/10	Effect of chair aerobics and pranayama on anxiety and **functional outcome** will be proved in field of cardiac surgery .
Effect of chair aerobics on quality of life in sedentary obese individuals .	Central European journal of sports science and medicine / Soniya T lohana et al.	Chair aerobics	Quality of life questionnaire 2 and sf 36 questionnaire .	100	6/10	Chair aerobics should a significant effect on **quality of life** with improved level of physical functioning , increase energy level and reduced fatigue level .
Combined chair based exercise improve functional fitness , mental well-being ,salivary steroid balance ,and anti-microbial activity in pre-frail older women	Journal musculoskeletal neuronal interact / F. Yamashita et al .	Chair rising exercise and one leg standing exercise	Time up and go test , one leg standing time ,tandem gait time .	30	6/10	Chair rising exercise was effective than one leg standing exercise for improving **walking velocity** and **dynamic body balance .**
Chair rising exercise is more effective than one leg standing exercise is improving dynamic body balance : A randomized clinical trial	Frontiers in psychology / Guilherme eustaguio et al.	Chair exercise program	Gait speed ,hand grip strength ,static balance and MWB questionnaire.	32	6/10	Chair exercise program was able to improve functional **fitness performance ,reduce feeling of stress, increase happiness, strength ,balance and gait** speed training are promising intervention to improve physical and mental health of older pre-frail adults.

RESULT

In this review, we have yielded 875 from which 43 full articles were read full, identifying 8 studies for inclusion and having chair-based exercise as an intervention.

Participants and setting:

All 8 studies were small (range of participants from 30 to 100) at single site. Participants range from 40-80 years. Three of the studies were completed in hospitals [1-3], one in a day center [5], one in a rehabilitation center [14], and three in a home setting. Participants studied included middle-aged women [1], the geriatric population [3-6], psychiatric patients [7], CABG patients [4], and the sedentary population. [8]

Intervention:

Each study evaluated a different form of CBE intervention, with variations in format, delivery, frequency, and intensity. Interventions ranged in duration from 6 weeks [4] to 12 weeks [1-5] with a frequency of exercise sessions ranging from daily [12] to three times a week [10, 11, 13]. The duration of each session also varied with one study reporting 30 minutes per session [14] and two others reporting up to 60 minutes per session.

Effect of CBE intervention:

A total of 13 outcome measures were (The Tinetti test, modified fall efficacy scale, Romberg's test, submaximal trade mill walking test, 6MWT, SF-36, quality of life questionnaire, finger to nose test, HHD & portable strength dynamometer, time-up-and-go test, gait speed, tandem gait time) used in the included studies.

For this systematic review, we divided them into three groups: balance and quality of life, and physical fitness.

No adverse effects were reported suggesting that CBE programmes appear to be simple, easy and safe for those who have poor mobility and balance.

Balance:

4 of the studies examined balance, using a variety of outcome measures related to balance. Two studies showed improvements in time-up-and-go (TUG) scores. One study noted a decrease in the modified fall efficacy scale score in the intervention group and one showed improvement in Tinetti gait balance.

Muscular strength:

4 out of 8 studies show improvement in strength using handheld-dynamometer. They found significant improvement in strength in the experimental group. 2 of the studies showed improvement in an older population, one study showed an increase in scores in middle-aged women and one study showed improvement in psychiatric disorder patients.

Quality of life:

4 studies examined the impact of chair-based exercise on quality of life. 2 studies used a quality-of-life questionnaire and they have showed significant improvement ($p=0.0006$). one of the studies showed improvement in Barthel index. The other one has showed significant improvement in the sf-36 questionnaire.

Physical fitness:

Other 3 studies focus on outcome measures related to physical fitness (strength, endurance, flexibility) they have shown significant improvements in these components in their studies.

Anxiety and depression:

One of the studies has shown improvement in the hospital anxiety depression scale in interventional group.

The intervention: (FITT protocol)
Frequency: 3time/week
Intensity: 65-80% of the age-predicted HRmax; (110–120 beats/min)
Time: 6 to 12 weeks incorporate with other forms of exercise

Type: aerobic, strength, flexibility, and balance training.

Aerobic training: (16-25min) the duration of training progressively increased, according to the recommendation of the ACSM. (knee lift, heel up, kick, lateral lunges, squats, and V step) in conjunction with continuous arm movements at the shoulder level as well as above the head.

Strength training: (1–3) sets, repetitions (8–15 RM), and the resistance of the dumbbells (1–3 kg), according to the recommendation of the ACSM. All strength exercises were performed following the (100–110 beats/min). (dumbbells, hand grippers, weight cuff), for the lower limbs (sit-to-stand exercise, adductor ball squeeze from sitting position, standing lateral hip raises with chair support, and calf raises with chair support), the upper limbs (triceps extensions, lateral raises, and bicep curls from the sitting position), as well as for the abdominal and dorsal trunk muscles (modified chair sit-ups, sitting twists, the seated cat-cow exercise, and seated knee lifts).

Balance training: 10-weeks, the number of sets (1–3), the repetitions/duration (8–15 reps or 10–30 s), (calf raises, standing hip extensions, and standing hip abductions) as well as dynamic balance exercises with different ways of locomotion (heel-to-toe forward walking, backward walking, lateral walking, heel walking, and toe walking). The static balance exercises were initially performed, with the support of one or two hands on the chair and then performed without the support of the hands on the chair.

Flexibility training:

Dynamic and static stretching exercises (chair-based seated and chair-assisted standing) for the whole body (12 exercises; 3 sets × 30 s for static/15 reps for dynamic exercise).

Chair based exercise protocols are an alternative approach to other exercise protocols in specialized population who has poor mobility, balance, and poor quality of life.

DISCUSSION

The aim of this systematic review, was to summarize recent studies on CBE intervention for various population such as psychiatric patients, geriatric population, pre-menopausal women, coronary artery by-pass grafting patients, sedentary individuals, patients with locomotive disorder and pre-frail older woman. We able to find CBE is help to improving physical fitness, balance and quality of life in various populations.

In this review, we have included a total of 8 studies, 4 have shown improvement in balance, 4 studies have shown the effectiveness of CBE in improving quality of life and, the remaining 3 studies have shown significant improvement in physical fitness (strength, endurance and flexibility). Chair-based exercise involves performing physical activities while seated or using the support of chair to improve strength, flexibility, balance, and cardiovascular health, especially for populations with poor mobility, and balance [1-3]. While sitting in a chair helps to engage specific muscle groups, helps to maintain posture by activating core muscles and stabilizers [1], reduces joint stress for those who have joint pain and arthritis, improves flexibility also emphasizes neuromuscular coordination without the risk of falls [5] and promotes the release of endorphins which improve mood and reduce anxiety [6]. Konstantina Karatrantou et al concluded, a 10-week music–kinetic integrated combined exercise program, using chair-based seated and chair-assisted standing flexibility, balance, and strength exercises as well as low-impact aerobic dance movements, is an effective intervention that induces significant cardiovascular and neuromuscular adaptations in middle-aged pre-menopausal women, without causing adverse side effects or injuries also provides perspectives for an alternative and efficient exercise approach that can be used with safety in fitness and

rehabilitation centers to ameliorate the functional capacity and overall fitness[1]. A study concluded by Soniya T. Lohana et al there was a significant effect of chair aerobics on the quality of life of sedentary obese individuals, with improved levels of physical functioning, increased energy levels, and reduced fatigue levels with much more added health benefits [4]. Saeko ikai et al have found the effect of chair yoga therapy on physical activities in patients with psychiatric disorders was positive and suggested the clinical utility of chair yoga intervention to enhance physical fitness and potentially reduce the risk of falls and fractures in patients with psychiatric disorders [5]. A study was done by Abeeshna et al concluded that Chair-aerobics and pranayama have a positive effect in improving anxiety, and six-minute walk distance in low to moderate risk subjects of CABG patients in phase I rehabilitation in improving their functional capacity [6]. A review done by Thomas Cordes et. al and concluded that CBE interventions have a positive effect on physical and cognitive functions as well as psycho-social well-being in nursing home residents, including those are unable to walk. For beneficial effect on multiple outcome domains, intervention should administer multicomponent exercises and include task-specific and motor-cognitive exercises [13]. Natalie Klempel et. al who had done a systematic review with meta-analysis in older adults, and he highlighted that chair-based exercise benefits in several aspects of physical function in older adults such as balance, gait, speed, grip strength and several other physical measurements.[14] Kevin Anthony et. al who stated that there is a significant improvement in function, mobility and mental health. He also encourages for use of CBE to improve mobility, postural stability, and cardio-respiratory fitness [15]. A Systematic review and meta-analysis done by Ferry Efendi et. al, proved that CBE improves physical functioning parameters, and sleep quality and lowers depression among older adults in LTCF [16].

In a recent review we emphasized that chair-based exercise has several benefits such as, Balance, gait speed, muscular strength quality of life, and several other physical measurements that were found as improved in participants who engaged in chair-based exercise. A key point for those who are currently inactive, and as such, chair-based exercise can be promoted as a safe, easy and simple progressive mode of activity for those who may be frail or deconditioned. Chair-based exercises should be promoted as simple, and easily implemented activities to maintain and develop strength and offset the negative effects of physical inactivity in endangered populations. For this reason, all health and exercise organizations such as the ACSM, the WHO, and the CDC recommend that there should be systematic participation of middle-aged and older individuals in combined exercise programs consisting of cardiovascular and neuromuscular activities as the most effective “non-pharmacological” intervention **[1]** for restrain the harmful effects of a sedentary lifestyle and aging. They also have given guidelines for the exercise rehabilitation of individuals having different medical conditions. In this context, during the last few decades, different sports and health professionals all over the world have focused on the design, implementation, and evaluation of different serial and integrated combined exercise programs using various activities and training means. Chair-based exercise programs have gained recognition as an alternative mode of exercise for improving health, functional capacity, and physical fitness and balance, especially in older and frail individuals who have activity limitations like standing and walking.

CONCLUSION

Chair-based exercises are simple, easy and safe can be promoted as progressive mode of activity or rehabilitation programme for those who may be frail or deconditioned to

improve balance, physical fitness and quality of life.

CLINICAL IMPLICATION:

Chair-based exercise along with other rehabilitation protocols are found to be effective, and safe can be added as a part of rehabilitation protocols in populations with poor balance, quality of life, and physical fitness.

Declaration by Authors

Acknowledgement: None
Source of Funding: Self
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Konstantina Karatrantou, Theodora Vasilopoulou and Panagiotis Loakimidis.A chair-based music kinetic combined exercise program as an alternative approach for increasing health, functional capacity and physical fitness indices in middle age pre- menopausal women. J Journal of functional morphology and kinesiology. 2023;8(2):81.
2. SH Thapa and Renu Pattanshetty. Effect of chair aerobics as low intensity exercise training on heart rate, blood pressure and six-minute walk distance in post coronary artery bypass graft surgery patients through phase I cardiac rehabilitation. J Nepalese heart. 2016;13(1):19-23.
3. Ashok Abheeshna and Gopalakrishnan Mundayat. Outcome of chair aerobics and pranayama on anxiety and exercise tolerance in coronary artery by-pass grafting patients: study protocol of randomized clinical trial. J International Journal of Surgery Protocols.2021;25(1):238-243.
4. Soniya T. Lohana, Trupti Yadav. Effect of chair aerobics on quality of life in sedentary obese individuals. J Central European Journal of Sports science and Medicine.2020;29(1):21-27.
5. Saeko Ikai, Hiroyuki Uchida, YUYA Mizuno, Hideaki Tani, Maki Nagaoka, Kenichi Tsunoda, Masaru Mimura and Takefumi Suzuki. Effect of chair yoga therapy on physical fitness in patient with psychiatric disorders: a 2-week single blind randomized controlled trial. J Journal of psychiatric research.2017;94:194-201.
6. Jose M. Cancela Carral, Estrella Pallin Orbegozo and Carlos Aysan Perez. Effect of three different chair-based exercise programs on people older than 80 years. J Rejuvenation research. 2017;20(5).
7. F. Yashmita, J. Iwamoto, T. Osugi, M. Yamazaki and M. Takakuwa. Chair rising exercise is more effective than one leg standing exercise in improving dynamic body balance: a randomized trial. J Journal musculoskeletal neuronal interact. 2012;12(2):74-79.
8. Ms k Arundhati Shivprasad, Dr Amrutkuvar Rayjade, Dr Trupti WARUDE AND Dr Vaishali Jagtap. Effectiveness of chair aerobics and Frenkel's exercise in geriatric population on balance and coordination – Randomized Control Trial. J International neurology journal. 2023;27(4).
9. Guilherme Eustaquio and Adriana Silva-Caldo. Combined chair-based exercises improve functional fitness, mental well-being, salivary steroid balance and anti-microbial activity in pre-frail older women. J Frontiers in psychology.2021;12.
10. Vaishnavi Amale and G. Vardharajulu. Effect of chair aerobics and resistance training on blood glucose level in diabetic post-menopausal women. J Costal Life Medicine. 2023;11(2).
11. Srushti Sakpal and Chandrakant Patil. Efficacy of Chair aerobics and progressive muscle relaxation in primary dysmenorrhea Costal Life Medicine.2023;11(2)
12. Thomas Cordes, Daniel Schoene, Wolfgang Kemmler and Bettina Wollesen. Chair based exercise intervention for nursing home residents: Systematic review. J Journal of the American medical directors association.2021;22(4):733-740.
13. Thomas Cordes. Chair based exercise interventions for nursing home residents: A systematic review. J JAMDA. 2020:1-8.
14. Natalie Klempel. Effect of chair-based exercise on physical function in older-adults: A systematic review and meta-analysis. J International journal of environmental research and public health.2021;18(4).1902.
15. Kevin Anthony. Chair based exercise for frail older people: A systematic review. J BioMed research international.2013.

16. Ferry Efendi. Effect of chai-based resistance band exercise on physical functioning, sleep quality and depression of older adults in long term care facilities: systematic review and meta-analysis. J International journal of nursing sciences. 2023;10(1).72-81.

How to cite this article: Shweta Dixit, Mansi Patel, Bharat Tiwari. Do chair based exercises help in improving balance, physical fitness, and quality of life in various populations? a systematic review. *International Journal of Research and Review*. 2024; 11(12): 449-456. DOI: *https://doi.org/10.52403/ijrr.20241249*

******