Indian Journal of Physiotherapy and Rehabilitation Science

IJPTRS Vol 1(2) Oct-Nov-Dec 2022 pp 12-18 EISSN 2583-4304

Access this article online

Website:http://www.ijptrs.com/
URL:https://www.ijptrs.com/article_issue_2.php
DOI:Shttps://www.ijptrs.com/assets/pdf/pdf%202%20issue%202.pdf

[1]Dean, Faculty of Medicine,School of Physiotherapy, RK University ,[1]Post Graduate Scholar, School of Physiotherapy, RK University.
Corresponding Author: Priyanshu V. Rathod , physio.priyanshu@gmail.com ,Bhavdip Pedhdiya,bpedhdiya234@rku.ac.in

Submission: 25-11-2022
Revised: 27-11-2022
Publish: 10-12-2022

Table of contents:

Designing and testing of interval training program (ITP) on physical and functional performance among elderly people: an experimental study.

Priyanshu V. Rathod[1] , Bhavdip Pedhdiya[1]

ABSTRACT

Background:

Exercise prescription is an essential part of physiotherapy practice. Interval Training Program (ITP) is one window solution for any population and any condition. It will reduce the occurrences of the injuries and will fasten the recovery. The process of aging in humans is characterized by a multitude of changes in all bodily systems that ultimately result in a decreased capacity to function and increased co-morbidities. Therefore, the purpose of this study is Designing and testing of ITP on physical and functional performance among elderly people.

Objectives:

To design the ITP for elderly people. To Analyze the Effect of ITP on 30-sec sit-to-stand Test (30STS). To Analyze the Effect of ITP on Peak Expiratory Flow Rate (PEFR). To Analyze the Effect of ITP on Berg Balance Scale (BBS).

Methodology:

61 elderly people were approached by old age homes. Informed written consent followed by assessment including inclusion and exclusion criteria as well as outcomes such as 30 STS, PEFR and BBS. 31+30 sample sizes were allotted for Control and Experimental groups. The Control group was free to do their Regular Activities and the Experimental group received ITP. Outcome measures were taken pre, after 2nd and 4th week.

Result and discussion:

Result of within and between-group analysis in which experimental group showed significant improvement in physical as well as functional performance in elderly people.

Conclusion:

The present study concluded that the Interval training program has an impact on Physical and Functional performance among elderly people.

Keywords:

Berg Balance Scale (BBS), Peak Expiratory Flow Rate (PEFR), 30-sec sit-to-stand Test (30STS).

Introduction

Exercise prescription is an essential part of physiotherapy practice. It is usuallyreferred to as a patient's specific fitnessplan for a specific goal and produced by a physiotherapist. Exercise prescription is important for increasing the body'sphysical and functional performance. [1] According to the World HealthOrganization, ExRx is planned, structured, repetitive, and purposeful inthe sense that it aims to enhance ormaintain one or more body components with the goal of physical fitness. [2]

Therapeutic Outcomes solely depend onExRx for example, Interval trainingprograms can improve cardiovascular fitness. Various components need to beadded to achieve an appropriateoutcome. For example, a Closed chainexercise can improve Pulse Rate and an Open chain exercise can reduce PulseRate. [3] Interval Training Program is one window solution for any population and any condition. ITP is defined as intermittent periods of intense exercise separated byperiods of recovery. [4]

ITP is the correct way of prescribing exercise to individuals because it provides rest between each exercise. ITP will reduce the occurrences of the injuries and will fasten the recovery. [5]

ITP is the active involvement of the participant and their relatives. The participant will get the feedback by experiencing the increase or decrease intheir exercise repetitions. Exercise should be given in such a manner so, it istime-saving and also include warm-upand cool down to achieve an appropriateoutcome. [6]

ITP mainly consists of Warm-up, Exercise circuit, and Cool down phases followed by Recovery phases 1 and 2, Also considering the components like Frequency, Intensity, Time, Type, Reputation and Progression. [7] Interval Training Program is based on specific intensity. The intensity gradually increases and reaches a 13 score of RPEthen gradually decreases with time. Ithelps to expand the anaerobic threshold and reduce fatigue levels. Also, provide rest time to get appropriate adaptation in elderly people. [9] India's elder population has beengradually reaching 13.8 crores at present. [8] Elderly individuals are divided into three groups: youngest-old, ages 65to 74 years; middle-old, 75 to 84 years; and oldest-old, ≥85 years. [1]

Aging in humans is characterized by a variety of changes in all body systems that eventually lead to a reduction in function and an increase in co-morbidities. Age-related changes in the four components of fitness are, (1) Cardiorespiratory endurance, (2)Muscular strength and endurance, (3) Balance, and (4) Body composition the people who are visiting physiotherapy clinics are most vulnerable as they are having co-morbidities. Interval Training Program increases a person's fitness level and prevents age-related co-morbidities. [11]. So, the purpose of this study Designing and Testing of the interval training program(ITP) on physical and functional performance among elderly people.

Method

After ethical clearance and CTRIregistration, in an experimental study, conducted 61 elderly people were randomly selected using the coin method. Subjects from Sadbhavna Vrudhashram and Matruchhaya Vrudhashram Dist. Rajkot was selected.

Between the Age group of 65 - 84 years,30STS test score greater than 8 and BBSscore greater than 40 were included. History of hospitalization in the last 6months and any health risk according to PARQ Plus scale were excluded. All the subjects have explained the purpose and test procedures, and written informed consent and basic assessment were taken before their enrolment in the study. Elderly people were distributed by coin method into two groups: Experimental Group (n=30) and Control Group (n=31).The experimental Group was

Performed Interval Training Program with 4 Supervised and remaining unsupervised sessions per week for 4 weeks. The Control Group was not Perform any kindof Exercise; they were doing their Regular Activities for 4 weeks. 30sec. Sitto Stand test, Peak Expiratory Flow Rateand Berg Balance Scale were taken as Outcome measures. Pre-Outcome Measures were taken on day 1 and Post Outcome Measures were taken after theend of the 2nd week and end of the 4th week of intervention.

Outcome measures

30 Sec. Sit to Stand:

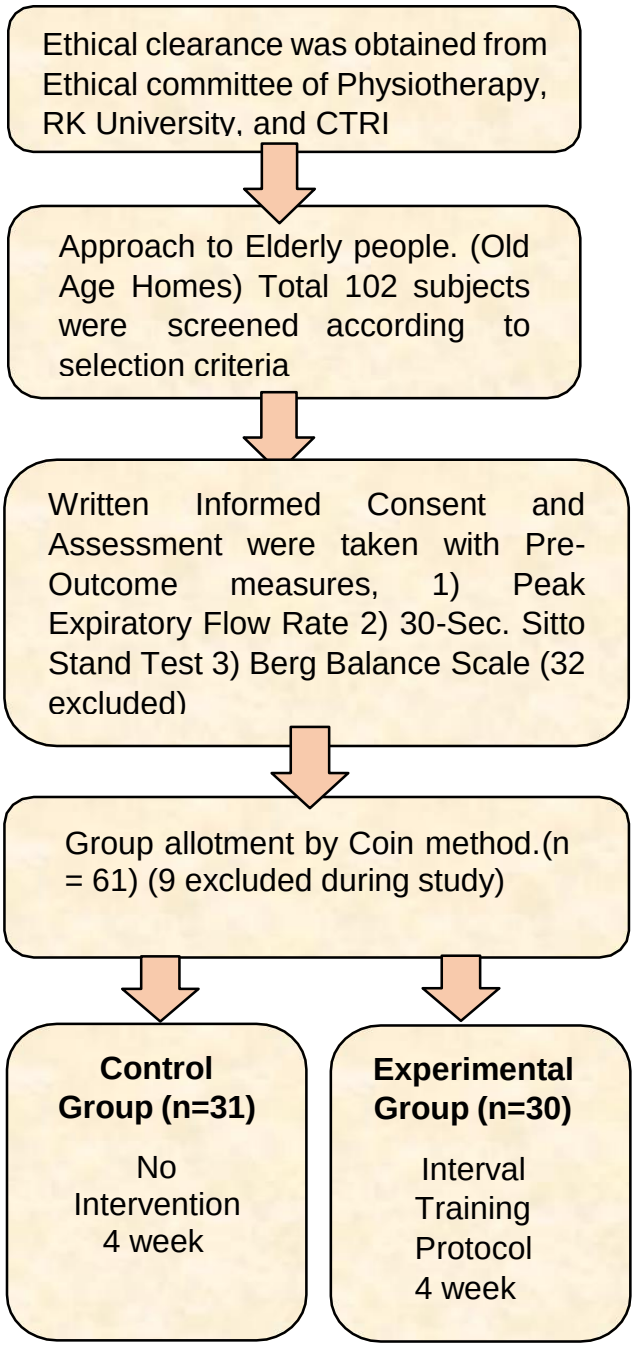
- Keep your feet flat on the floor andsit in the middle of the chair. Maintain a straight back and straight arms against your chest.
- When the "Go" button was pressed, rise to a full standing position and then sit back down. Do this for another 30 seconds.
- Keep track of the 30-second repetitions. [6]
- Peak Expiratory Flow Rate:
- Set the cursor on the PEFRMachine to zero. When exhaling, do not touch the cursor. Hold the peak flow meter horizontally in front of your mouthwhen standing or sitting.
- Take a big breath in and firmly clamp your lips around the mouthpiece, ensuring that there isno air leakage.
- Exhale as strongly and as quicklyas you can. Make a mental note of the numberindicated by the cursor.
- Reset the cursor to zero and repeat the process twice more, forthree readings. Take the highest or best reading of all three metrics and write it down. [7]

Berg Balance Scale:

- BBS helps to assess Balance andRisk of fall in Elderly People. BBS includes 14 components and eachscore 0 – 4, Total score is 56.
- **Interpretation**:
  41-56 = independent,
  21-40 = walking with assistance, 0 –20 = wheelchair bound

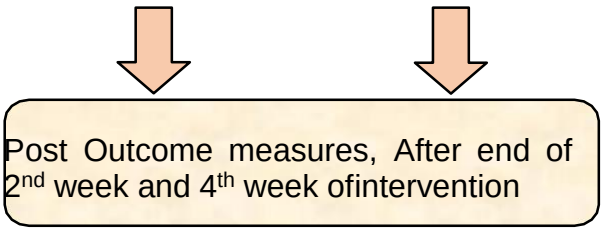
Cut off Scores: A score of < 40 on BBS is associated with almost 100% fall risk.[8]

Procedure



Intervention

In ITP, Frequency was 2 sessions/day Minimum 10 sessions/week, 4 weeks. Intensity was at Rate of Perceived Exertion (RPE) 13. Type was Interval Training Program. Time was each session is 20 minutes. Repetition was counted 1st day of every week (RPE maintain 13) Progression was Increase Repetitions and Sessions every week.



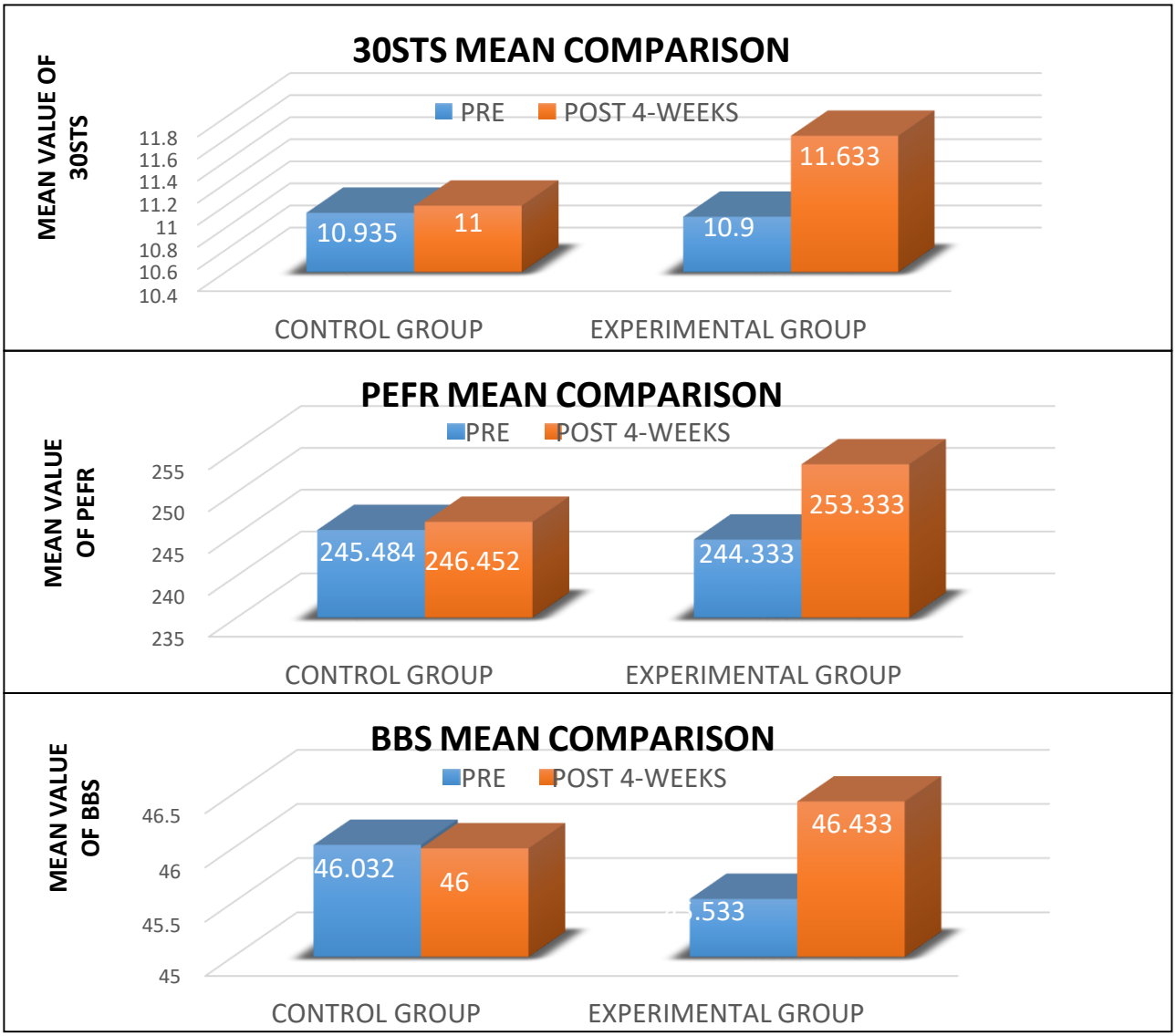
Phase	Starting Phase (3 min)	Warm-Up (3 min) (1 min Rest)	Exercise Circuit (3 min) (1 min Rest)	Cool Down (3 min) (1 min Rest)	Recovery Phase 1 (3 min)	Recovery Phase 2 (3 min)
Exercise 1	Supine	Trunk Rotation (1.5 min)	Step Up and Down (1.5 min)	Sit to Stand (1.5 min)	Supine	Supine
Exercise 2	Supine	Sit to Stand (1.5 min)	Wall Push Up (1.5 min)	Trunk Rotation (1.5 min)	Supine	Supine
Note: Intensity should be maintained at 13 scores on the RPE scale (Appendix 3)						

Statistical analysis

SPSS Software version 25 was used for data analysis, and to generate Graphs and tables. Primary outcome measure age was taken to identify the normality by ShapiroWilk Test, Skewness, and Kurtosis. Data were normally distributed so the Repeated Measure ANOVA Test was used for within Group The level of significance was considered less than 0.05 and the confidence interval was kept at 95%.

Result

Between Group Mean Comparison of 30STS, PEFR and BBS (Both Group)



Interpretation: The above Graph shows a significant difference between the Mean Comparison of 30STS, PEFR and BBS in Experimental group than the Control group.

Between Group Comparison of Wilk's Lambda in 30STS, PEFR and BBS(Both Group)

OUT COMES	WILK'S LAMBDA	
	CONTROL GROUP	EXPERIMENTAL GROUP
30STS	0.167	0.018
PEFR	0.622	0.014
BBS	0.830	0.002

Interpretation: The above table show the between group comparison of **Wilk's Lambda test** the value **<0.05,** suggests that **significant improvement** in the Experimental groupthan the Control group after the end of the 2nd and 4th Week of Intervention.

Discussion

In the present study, Between Group comparison, found that the significant mean of the Experimental group is higher than the control group in values of 30STS, PEFR and BBS.

There is a mild increase in parameters ofthe control group for a certain reason. Asit was priory informed, that again assessment would be taken after the second and fourth week, were make people more aware of their health, so this may be the reason why there is a mild increase in the outcome measures of thecontrol group.

ITP includes Sit to Stand and Step up & down exercise, which enhances the vasomotor tone. More blood and ATP production in working muscles leads to an increased anaerobic threshold at the end of the training that will eventually contribute to an increase in functionalperformance. [9,10] Developed ITP, is activity-specific, it is not limited to a particular muscle activation hence it targets large muscle groups. Trunk rotation and Wall Push-Up were two specific exercises include in the protocol.

During exercise Chest muscle stretching and Chest expansion were occurring. That stimulates Respiratory receptors. Ultimately, increase Respiration, Ventilation and Perfusion. It helps to improve Oxygen carrying capacity. Which leads to improvement in pulmonary function. [11]

In ITP, including large muscle groups such as trunk and lower limb muscles, so the blood flow increases in the muscles and joint areas. It increases joint proprioception and leads to stimulating Spinal reflexes,Vestibule-spinal tracts and higher centers of the brain, which will ultimately improve a person's balance. Exercise increases lower limb Strength, Mobility and Stability, which will lead to improvements in Functional performance and Balance. [12]

ITP is activity-specific and not limited to aparticular muscle activation hence it targets large muscle groups. This enhances the vasomotor tone, and more blood and ATP production in the working muscle, which leads to an increase in anaerobic threshold and reduces fatiguelevel at the end of the training, will eventually contribute to an increase in functional and physical performance.[13] These discussions suggest that the four weeks of the interval-training program were effective in improving Physical and Functional Performance among elderly people.

Conclusion

In context to statistical analysis and discussion of the present study concluded that the interval-training program showed significant improvement in 30sec. Sit to Stand, Peak Expiratory Flow Rate and Balance (BBS)in the elderly population in the experimental group as compared to the control group. Interval-training program needs to be taken into consideration for elderly people as well as a younger community to enhance the quality of careand quality of life of every individual. The RPE-specific intensity and ADL-specific exercise must be having a major impact on overall improvement.

Future scopes

The same program can be applied to different Populations and different Outcome measures to analyze physical and functional performance.

CTRI no

CTRI/2022/01/039583

Conflict of interest

Nil

References

1. Edward M. Phillips, et al, "The exercise prescription: a tool to improve physical activity." Pm r. 2012Nov; 4 (11):818-25.
2. Martin J. MacInnis, et al, "Physiological adaptations to intervaltraining and the role of exercise intensity." The journal of physiology 595.9 (2017): 2915-2930.
3. M. Izquierdo, et al, "International Exercise Recommendations in Older Adults (ICFSR): Expert ConsensusGuidelines." J Nutr Health Aging. 2021; 25(7):824-853.
4. Tenzin Zompa, "India's elderly population to rise 41% over next decade to touch 194 mn in2031: Govt report." National Statistical Office(NSO)'s 6 August 2021.
5. James W. Bellew, et al, "Geriatric Fitness: Effects of Aging and Recommendations for Exercise in Older Adults." Cardiopulmonary Physical Therapy Journal: March 2005 - Volume 16 - Issue 1 - p 20-31.
6. Narintip Roongbenjawan, et al, "Accuracy of modified 30-schair-stand test for predicting falls in older adults." Ann Phys Rehabil Med.2020 Jul; 63(4):309-315.
7. Ms. Ashwini Vidyasagar Mishra, et al, "Peak Expiratory Flow Rate Measure among Community-Dwelling Elderly Rural Population." IOSR Journal of Nursing and Health Science, Mar. - Apr .2019, Volume 8, Issue 2 Ser. VIII, PP 25-30.
8. Berg K, Wood-Dauphinee S, et al, Maki B, "Measuring balance in theelderly: validation of an instrument." Can. J. Pub. Health, 1992, July/August supplement 2: S7-11.
9. Huliya Nilgiin Gurses, "Effects of Gender and Physical Activity Level on Sit to Stand Test Performance AmongYong Adults", Bezmialem Science 2020;8(3):222-6.
10. Anna L. Hudson, "Role of the Diaphragm in Trunk Rotation", Journal of Neurophysiol. 2011 Oct. 106(4): 1622-1628.
11. Chandolkar GS, et al, "Effect of Structured Exercise Programme on Pulmonary Function and Physical Performance in Geriatric Population." EXECUTIVEEDITOR. 2020 Jan 1;11(01):233.
12. Babel DK, et al, "Trunk rotationexercises versus sit-to-stand training with a step-foot position on balance and gait in patients with chronic stroke." Indian Journal of Physical Therapy and Research. 2021 Jul 1; 3(2):83.
13. Carolyn Kisner, Therapeutic exercise-foundation and techniques,6th edition, 2012. 7: pp 251.