



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

The Effect of Virtual Reality Based Training in Improving Physical Fitness among Female College Students

M. S. Daniyaniveda*, Ahamed Thajudeen

* College of Physiotherapy, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore, 641044, Tamil Nadu, India,
E-mail: daniyanivedams@gmail.com*, ahamptsp@gmail.com

ABSTRACT

This study aimed to evaluate the effectiveness of virtual reality based training in improving physical fitness among female college students. The physical fitness is measured using a modified t- test . A single group experimental study implemented at Sri Ramakrishna Hospital, Coimbatore. Involving 20 students at age group of 18-24years studying in Sri Ramakrishna College Of Physiotherapy, Participants were selected using simple purposive sampling method. The study involves pre and post test experimental study with Virtual Reality based training period of 3 sessions in a week for 4 weeks. The post test shows significant improvement in physical fitness than pre test with t value is 11.72. The results indicates there is a significant improvement in physical fitness and training period is enjoyable to students

INTRODUCTION

Physical fitness is a state of health and well- being and more specifically, the ability to perform different sports, occupation and daily activity. Physical fitness is achieved through proper nutrition, moderate physical exercise, and formal recovery. It is composed of cardiovascular fitness, muscle strength, muscle endurance, and flexibility. Before the industrial revolution, fitness was defined as the capacity to carry out the activity without fatigue or lethargy. Nowadays, physical fitness is considered as a measure of the body's ability to function effectively in work and leisure activities. The components of fitness are agility, speed, coordination, power, reaction time, balance. Agility is the ability to physically move quickly and effectively with changing in direction.

Endurance is defined as the ability to sustain a certain intensity over a longer period of time and to recover as soon as possible. example: long distance running, cycling, long course swimming are typical endurance sports. Endurance is indicator of physical fitness, reflecting muscle ability to resist fatigue during prolonged exercise. Aerobic endurance is body ability to sustain medium to high intensity physical exercise for extended period of time in oxygen rich environment. Endurance training is impacted on various physiological factors including the efficiency of energy systems, aerobic capacity, lactase threshold, muscular strength and endurance. $\text{VO}_{2\text{max}}$ is the maximum amount of oxygen that body can supply per minute, serving as a key indicator for aerobic fitness.^[1]

Virtual reality is computer generated stimulation of a three-dimensional environment that immerses users in virtual world stimulating reality through sensory experience. Virtual reality generates artificial sensory experiences, including visual, auditory and tactile stimuli, enabling users to interact with objects in virtual environment

The outcome used to assess agility in this study is modified t- TEST. Modified t- test is used to determine speed with directional changes such as forward sprinting, left and right shuffling and back pedaling. The test has a high constructed validity of 0.89 and reliability of 0.89. In recent years, the positive impact of virtual reality based physical activity on health has been documented.. However, despite these benefits, physical activity is frequently seen as boring and hard, pushing people away from it. Many young adults prefer spending time by watching television and playing video games which is indicator for sedentary life style. Around 20% of adults and 80% of adolescents worldwide remain physically inactive due to social and lifestyle modifications.^[2]

Therefore virtual reality based training is attractive for subjects which makes training process playful. This makes subject to develop interest in a fitness training program.

METHODOLOGY

1. STUDY DESIGN

The study was a single group pre and post-test experimental study.

2. TRAINING DURATION

Training was given for 3 session in a week for period of 4 week

3 STUDY SETTINGS

SRIPMS ground, Sri Ramakrishna Hospital (Neuro Rehabilitation Centre)

4 SAMPLE COLLECTION

College of Physiotherapy, SRIPMS

5 SAMPLE METHOD

Simple purposive sampling method

6 SAMPLE SIZE

20 female subjects were selected between the age group of 18 – 24 years.

7 SELECTION OF CRITERIA

- INCLUSION CRITERIA

Age group (18 -24)

Female genders only

BMI< 25

- EXCLUSION CRITERIA

Recent injuries

Undergoing rehabilitation for previous injuries

Case of chest pain and dyspnea

Neurological problem

8. ORIENTATION TO THE SUBJECT

The subjects were assembled and oriented to the requirements of the study. The method of taking measurement was demonstrated and informed concerns were obtained from the subject prior to the study. The students were motivated to give their best during the testing period.

9. MATERIALS REQUIRED

- Semi immersive type VR
- Stationary
- Recording sheets
- Cones
- Stop watch
- Inch tape
- Flat surface
- Whistle

10. TRAINING PROCEDURE

- The selected 20 subjects were given 4 weeks of exercise. The programme was increased in levels in semi immersive virtual reality specific time for 15 minutes in a day for 3 sessions in a week
- After 4 week training post test measurement were taken
- Difference between pre test and post test were calculated by paired t -test

Training units components	Activity	Duration
Warm up	Warm up	2 minutes
Virtual reality based training	High knees	5 minutes
	Squatting	5 minutes
Cool down	Cool down	2Minutes

20 female subjects were taken for this study (n =20)



Pre - test is measured by modified t- test



Training sessions: 3session in a week for a period of 4 week of high knees, squatting by semi-immersive virtual reality



post test is measured by modified t- test



Stastical analysis and result

TEST ADMINISTRATION

MODIFIED AGILITY T - TEST

The student's Physical fitness is measured by modified agility t – test

- The distance of cone is modified
- The number of directional changes are maintained the same
- The subjects are covered a total distance of 10 m modified t- test

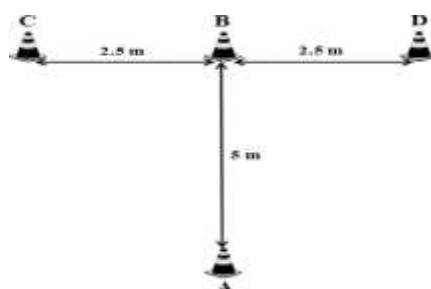
- Explain the test procedure to students

SET UP

Four cones were arranged in a T shape, with a cone placed 5 m from the starting cone and two further cone is placed 2.5 m on either side of the second cone.

PROCEDURE

- Subjects were asked to sprint forward 5m from start line to first cone and touch the cone with their right hand
- Shuffle 2.5 m left to second cone and touch with left hand
- Shuffle 5 m to right to third cone and touch with right hand
- Shuffle 2.5 m back left to mid cone and touch with their left hand before finally back pedaling to start line
- Time began upon subjects passing through the timing gate and stopped upon them passing through return



TOOLS USED IN STUDY

- Semi immersive virtual reality

VARIABLE

- Dependent variable
Agility
- Independent variable
Virtual reality based endurance training

S.NO	AGE	PRE-TEST	POST-TEST	MEAN
1	19	10.34	8.90	1.95
2	19	11.48	9.70	1.78
3	19	11.38	9.83	2.15
4	19	15.24	12.61	2.63
5	19	12.28	12.14	0.14
6	20	10.11	9.31	0.8
7	21	11.12	9.93	1.19
8	21	14.14	12.71	1.43

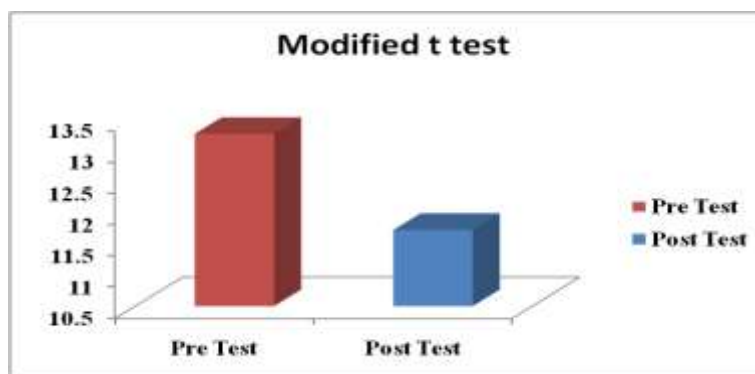
S.NO	AGE	PRE-TEST	POST-TEST	MEAN
9	22	17.22	15.00	2.22
10	22	14.90	13.31	1.59
11	23	13.39	11.77	1.62
12	22	8.90	8.10	0.8
13	21	11.88	10.37	1.51
14	22	13.17	11.64	1.49
15	22	14.14	12.77	1.37
16	22	15.51	13.57	1.94
17	22	17.58	16.71	0.64
18	22	13.3	12.38	0.92
19	22	14.38	12.91	1.47
20	23	14.35	11.4	2.95
MEAN		13.26	11.72	30.62

Computation of 't' ratio of pretest and post test - MODIFIED T-TES

MODIFIED T-TEST	MEAN	STANDARD DEVIATION	't' VALUE
Pre - test	13.26	2.20	10.07
Post - test	11.72	2.11	

RESULT

The effectiveness of virtual reality based training in improving physical fitness was measured by modified t- test . Initially the mean score is 13.26 and standard deviation is 2.20 .after 4 weeks of virtual reality based training the mean score is decreased to 11.72 and standard deviation 2.11 the t-test time significantly decreased from pre to post test .statistical analysis revealed calculated t-value of 10.07 , suppressing critical t-value 1.729 at a 0.05 significant level.This result demonstrates the virtual reality based training provides significant improvement in agility.



DISCUSSION

Physical fitness is an important factor to maintain normal metabolic process cardiovascular, muscle strength etc. Virtual reality based fitness training encourages students to actively participate in fitness training. The training process tends to be playful; this makes individuals prone to develop interest in fitness training. The study aims to investigate the effect of virtual reality based training in improving level of physical fitness. High intensity training with intervals of time involving virtual reality technology was much more effective and attractive for students. Which can accelerate result of physical fitness. Training was given through semi-immersive virtual reality for 3 session in 4 weeks.

The performance of students is tested by modified t-test as to identify the improvement in Physical fitness. This training turns a low level of Physical fitness into high one thus the uniqueness and novelty of this study was virtual reality based training had an effect on changes in quality of Physical fitness.

The purpose of this study was to find out the effect of virtual reality based training in improving Physical fitness among female students. According to findings of Milena kuleva, virtual reality based training is enjoyable and it promote improvement in physical fitness. According to finding of Andria shimi, Antonis papantoniou, kleanthis neokleous (2022), virtual reality training can provide improvement in physical and mental skills

CONCLUSION

The result of the study shows virtual reality based training in female college students significantly improves physical fitness as it measured by modified t test. The semi immersive virtual reality based training exercise includes high knees, squatting since improvement can be seen in their performance. It can be concluded that virtual reality based training among female college students is effective in improvement in their physical fitness. Within the limitation of present study the following conclusion is drawn

LIMITATION

- The only female subjects are included in study
- The subject with BMI < 25 were taken
- The study is single group design

RECOMMENDATION

- The present study can be repeated by selecting the subjects belonging to other age group
- The both male and female subjects can be included
- The study could be conducted with control group design

7. REFERENCES

1. un X. Physical fitness of athletes under endurance training. *Revista Brasileira de Medicina Do Esporte*. 2023 Jan 13;29:e2022_0530.
2. Gani RA, Setiawan E, Achmad IZ, Aminudin R, Purbangkara T, Hofmeister M. Virtual reality-based tabata training: a professional method for changing levels of physical fitness and psychological well-being of student-athletes. *Pedagogy of Physical Culture and Sports*. 2023 Apr 30;27(2):91-101
3. Khundam C, Noël F. A study of physical fitness and enjoyment on virtual running for exergames. *International Journal of Computer Games Technology*. 2021;2021(1):6668280.

4. Ciężżyńska J, Maciaszek J. Effects of Low-Immersive vs. High-Immersive Exercise Environment on Postural Stability and Reaction and Motor Time of Healthy Young Adults. *Journal of Clinical Medicine*. 2023 Jan 3;12(1):389
5. Wu Q, Han R, Li Z, Huang X, Cheng D, Ni J, Zhang S, Tan X, Kang P, Yu S, Chen A. Effect of virtual reality-based exercise and physical exercise on adolescents with overweight and obesity: study protocol for a randomised controlled trial. *BMJ open*. 2023 Oct 1;13(10):e075332.
6. Høeg ER, Bruun-Pedersen JR, Serafin S. Virtual reality-based high-intensity interval training for pulmonary rehabilitation: a feasibility and acceptability study. In: 2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW) 2021 Mar 27 (pp. 242-249). IEEE.
7. Kuleva M. Application of virtual reality to the enhancement of physical activity and sports for healthy individuals. A systematic review. *Journal of Applied Sports Sciences*. 2023 Aug 15;1:69-79.
8. Cancela-Carral JM, Campo-Prieto P, Rodríguez-Fuentes G. The IntegraPark Study: An Opportunity to Facilitate High-Intensity Exercise with Immersive Virtual Reality in Parkinson's Disease Patients. *Journal of Functional Morphology and Kinesiology*. 2024 Sep 3;9(3):156
9. Maden Ç, Bayramlar K, Arıca OT, Yagli NV. Effects of virtual Reality-Based Training and aerobic training on gaming disorder, physical activity, physical fitness, and anxiety: A randomized, controlled trial. *Mental Health and Physical Activity*. 2022 Oct 1;23:100465.
10. Mocco A, Valmaggia L, Bernardi L, Alfieri M, Tarricone I. Enhancing Physical Activity with Immersive Virtual Reality: A Systematic Review. *Cyberpsychology, Behavior, and Social Networking*. 2024 May 1;27(5):303-17.
11. Köyağasıoğlu O, Özgürbüz C. The effects of virtual reality nonphysical mental training on coordination and skill transfer in healthy adults. *Journal of Sport Rehabilitation*. 2022 Jan 25;31(4):442-51.
12. Köyağasıoğlu O, Özgürbüz C, Bediz CŞ, Güdücü Ç, Aydınoglu R, Akşit T. The effects of virtual reality nonphysical mental training on balance skills and functional near-infrared spectroscopy activity in healthy adults. *Journal of Sport Rehabilitation*. 2022 Feb 1;31(4):428-41.
13. Dana A, Hamzeh Sabzi A, Christodoulides E. The effect of virtual reality exercises on dynamic balance of children with developmental coordination disorder. *Journal of Humanities Insights*. 2019 Sep 1;3(03):123-8.
14. Li X, Huang J, Kong Z, Sun F, Sit CH, Li C. Effects of virtual reality-based exercise on physical fitness in people with intellectual disability: a systematic review of randomized controlled trials. *Games for health journal*. 2023 Apr 1;12(2):89-99.
15. de Melo GE, Kleiner AF, Lopes JB, Dumont AJ, Lazzari RD, Galli M, Oliveira CS. Effect of virtual reality training on walking distance and physical fitness in individuals with Parkinson's disease. *NeuroRehabilitation*. 2018 Jan 1;42(4):473-80.
16. Lotan M, Yalon-Chamovitz S, Weiss PL. Improving physical fitness of individuals with intellectual and developmental disability through a Virtual Reality Intervention Program. *Research in developmental disabilities*. 2009 Mar 1;30(2):229-39.
17. Peng X, Menhas R, Dai J, Younas M. The COVID-19 pandemic and overall wellbeing: mediating role of virtual reality fitness for physical-psychological health and physical activity. *Psychology Research and Behavior Management*. 2022 Jul 13:1741-56.
18. Barsasella D, Liu MF, Malwade S, Galvin CJ, Dhar E, Chang CC, Li YC, Syed-Abdul S. Effects of virtual reality sessions on the quality of life, happiness, and functional fitness among the older people: a randomized controlled trial from Taiwan.
19. Bae MH. The effect of a virtual reality-based physical education program on physical fitness among elementary school students. *Iranian Journal of Public Health*. 2023 Feb;52(2):371.
20. Lee HT, Kim YS. The effect of sports VR training for improving human body composition. *EURASIP Journal on Image and Video Processing*. 2018 Dec;2018:1-5.
21. Pérez-Muñoz S, Castaño Calle R, Morales Campo PT, Rodríguez-Cayetano A. A systematic review of the use and effect of virtual reality, augmented reality and mixed reality in physical education. *Information*. 2024 Sep 21;15(9):582.
22. Bedrunka D, Buchta K, Szary P, Maniakowska K, Kiper P, Rutkowska A, Rutkowski S. The effect of virtual reality exercise on physical fitness. *Medical Rehabilitation*. 2019 Aug 26;23:4-9