

# Effect of Virtual Reality Therapy and Vestibular Training in Individuals with Acrophobia: A Comparative Study

Niyati Trivedi<sup>1</sup>, Dr. Deepali Hande<sup>2</sup>

<sup>1</sup>BPT Student, Professor, Community Physiotherapy, Dr. A.P.J. Abdul Kalam College of Physiotherapy

<sup>2</sup>Dr. A. P. J. Abdul Kalam College of Physiotherapy, PIMS (DU), Loin

**Abstract:** *Background:* The aim of the study was to determine effectiveness of VRET in comparison with vestibular rehabilitation in individuals with acrophobia. *Methodology:* The participants included in the study were divided into two groups randomly. 30 participants were included out of which 15 were randomly grouped into Group A and other 15 in Group B. Group A was treated with virtual reality therapy and Group B was treated with vestibular training for 4 weeks. *Results:* The results of the study showed mean and SD values of virtual reality therapy and vestibular exercises as  $6.26 \pm 1.53$  of group A and  $8.06 \pm 1.57$  of group B, with the unpaired t test value of 7.78 and p value  $< 0.001$ . Thus the study showed that virtual reality therapy and vestibular training were significant in reducing the symptoms of acrophobia. *Conclusion:* The study concluded that both the virtual reality therapy and vestibular training were effective in reducing symptoms of acrophobia. On comparing the post results of both the groups it concluded that the virtual reality therapy was more effective than vestibular training.

**Keywords:** Acrophobia, Virtual Reality Therapy, Vestibular Training

## 1. Introduction

Phobia is defined as an unsubstantiated fright of an activity, situation or a thing. The fear is so extreme that it restricts a person's activity of daily living. Acrophobia is an abnormally excessive persistent fear of height. Sufferers face anxiety, dizziness, nausea and an intolerable traumatic experience. Acrophobia is derived from Greek word "acron", height and "phobos", fear.<sup>[1]</sup> It belongs to the category of specific phobias called space and motion discomfort that share both similar causes and options of treatment. People with acrophobia get panic attacks at high places and become too agitated to get themselves down safely. Traditionally acrophobia like any other phobia is attributed as a traumatic or conditioning experience. The newer non-association theory is that a fear of height is an evolved adaptation to a world where falls posed to significant danger. A possible contributing factor is dysfunction in maintaining balance. In this case anxiety is both well founded and secondary.<sup>[2]</sup> The visual stimulus induces the acrophobia that provokes height vertigo. There are some factors that can be hereditary or acquired such as trauma or previous experience that provoke acrophobia such as balance impairment and vestibular dysfunction.<sup>[3]</sup> Symptoms due to vestibular disorders can diminish the quality of life as the patients find difficult sometimes even to climb up the stairs and therefore they restrict themselves from going to higher altitude places and impact all aspects of daily living. They also contribute to emotional problems such as anxiety and depression. Treatment strategies used for acrophobia are: (1) Virtual Reality Therapy (2) Vestibular Training.

Virtual Reality Therapy- Virtual Reality Exposure Therapy (VRET) consists of VR technology meticulously handled by therapist. It provokes fear related responses in an empirically safe background which is similar to real life situations and

gives the patient a chance to interact with virtual scenarios in the same manner as with real environment. The inhibitory function allows for a conversion to a response which is more relevant to goal or circumstances. Inhibiting the fear responses is the ability to distinguish between danger and safety signals and overpower fear responses in the presence of safety cues. Inhibitory learning derives from habituation and extinction learning, and involves challenging fear-eliciting stimuli in the absence of negative results, and learning new no-threat relations between neutral and feared stimuli until the level of anxiety diminishes.<sup>[4]</sup>

The vestibular rehabilitation in acrophobic people help to reduce visual intolerance. It helps to improve balance by correcting visual-vestibular impairment which commonly induces acrophobia. It is an exercise-based program primarily designed to reduce vertigo and dizziness, gaze instability, and/or imbalance and falls. Vestibular Training can help with recovery by promoting compensation.

The goal of Vestibular training is to use a problem-oriented approach to promote compensation. This is achieved by customizing exercises to address each person's specific problem(s). Gaze Stabilization exercises are used to improve control of eye movements so vision can be clear during head movement.

## 2. Methodology

### 2.1 Participants

An approval for the study was obtained from the Institutional Ethical Committee (Ref no-PIMS/DR.APJAKCOPT/ IEC/ 2019/ 482). The study was conducted in OPD setting of Dr. APJ Abdul Kalam College of Physiotherapy. 30 participants aged between 19-25 years, both males and females willing to participate were included.

Volume 9 Issue 10, October 2020

[www.ijsr.net](http://www.ijsr.net)

Licensed Under Creative Commons Attribution CC BY

Exclusion consisted of history of epileptic episodes, history of migraine, skin allergy to sensors recent, surgical history, any other anxiety disorder. A written consent was taken from each participant prior to the study. 30 participants were grouped randomly into Group A receiving VRET and Group B receiving Vestibular training.

## 2.2 Measurements and outcome measures

Demographic data was collected, and the participants were evaluated with Visual Height Intolerance Scale before and after 4 weeks of intervention.

**Visual Height Intolerance Scale (VHI):** Visual height intolerance scale is a scale based on a set of eight questions for determining the severity of visual height intolerance. Two questions of the list are : one of symptoms and one of triggers. Two additional questions are for assessment of acrophobia.

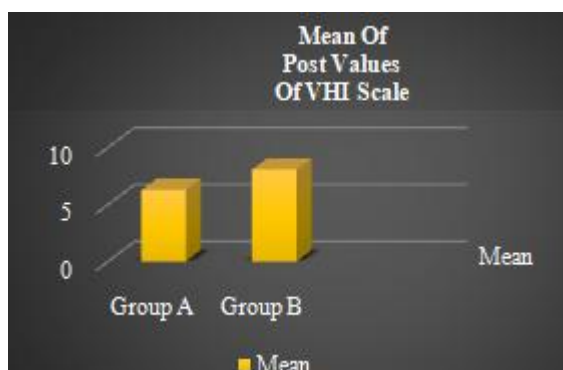
## 2.3 Intervention

30 participants were divided into two groups using simple random sampling. Group A received Virtual Reality Therapy for 4 weeks. In this therapy the participants were asked to wear virtual reality binoculars and were exposed to virtual environment which consisted of situations that made the participants face high places like roller coaster ride, open lift, terrace of a building. In first session the participant were allowed to get acquainted to the virtual environment for 5mins. Group B received Vestibular Training for 4 weeks which consisted of gaze stability exercises to be performed on different base of supports such as on mat, foam, balance board and while climbing and descending stairs.

## 3. Data Analysis and Result

**Table 1:** Showing values of t and p after performing unpaired t-test in individuals with acrophobia of Group A and Group B

Groups	Mean±SD	t Value	P Value
Group A	6.26±1.53	7.78	p<0.001 Significant
Group B	8.06±1.57		



**Figure 1:** Graph showing post-post values of Group A and Group B

### 3.1 Result

The Mean and SD value of Group A is 6.26±1.53 and that of Group B is 8.06±1.57. With the t value of 7.78 and p value<

0.001. Which shows that both the study groups are significant but Group A is More significant than Group B.

## 4. Discussion

The aim of the study was to study the effectiveness of the virtual reality therapy in comparison with vestibular training in individuals with acrophobia. The present study included 30 participants with the score from 7 to 13 (moderate to high) of VHI scale out of which 15 were in Group A and 15 in Group B. Group A received Virtual reality therapy and Group B received vestibular training. The result concluded that the present study was significant. Virtual reality therapy was effective as it reduced the symptoms of the participants by habituating the brain to tolerate the fearful situation as it created an environment similar to as the participant would experience while exposed to real height places. People with acrophobia tend to avoid going to high places, this therapy helps them to get acquainted with the fearful situation and regulates the brain to get habituated to it. P.M.G. Emmelkamp et al did a similar study to check the effectiveness of virtual reality therapy on acrophobic people and the study concluded that low budget VRET can be beneficial for individual and the results remained same even after 6 months of follow up. Another study done by Babara Olsav Rothbaum also showed that virtual reality therapy is highly significant in reducing symptoms in individuals with acrophobia. We got this results may be because the therapy causes brain reappraisal and the frightful nature of the participant gradually decreases. This effect may occur as the brain gets more and more wary about the situation. It also habituates the person by decreasing the anxiety, dizziness, nausea and all other symptoms related to it.

Vestibular Training in individuals with acrophobia also came out to be significant in this study. The approach of the vestibular training is supposed to be problem-oriented. Coehlo C, Silvia J Pereira et al- studied the effect of trigger motion sickness and postural balance in acrophobia. The Sharpened Romberg Test was used to test participant's postural balance. The Rod and Frame Test (RFT) measures the participant's ability to align a rod to the vertical within a titled frame providing a measure of error in the perception of verticality by degrees. Their study concluded that all disorders are correlated with each other and might have visual-vestibular origin. The rod and frame test was exclusively correlated with motion sickness whereas the postural stability test only displayed sensibility to acrophobia. Preliminary evidence suggests that vestibular physical therapy may be of value for patients with agoraphobia and laboratory evidence of vestibular dysfunction. Furthermore, in a recent study, Rahko found that close to half of the patients with benign positional vertigo had acrophobia and that, in all of the patients, these symptoms had remitted after vestibular rehabilitation.

Both the professions of physical therapy and psychotherapy use forms of exposure therapy as part of patient management. Behavioural management of phobias is based on therapeutic exposure, a procedure in which patients face the feared stimulus repeatedly for a prolonged period. The therapeutic benefit derives from habituation and breaking the association between the anxiety and the stimulus. Such

therapy can use actual exposure (in vivo) or conjured feared stimuli in imagination (Virtual Reality). Virtual reality exposure is safer and more practical for office treatment than in vivo exposure. In addition, it does not depend on patients' capacity for imagination, although it requires that they be able to immerse themselves within the virtual environment.<sup>[5]</sup>

## References

- [1] Juan MC, Baños R, Botella C, Pérez D, Alcaníiz M, Monserrat C. An augmented reality system for the treatment of acrophobia: the sense of presence using immersive photography. *Presence: Teleoperators and virtual environments*. 2006 Aug 1;15(4):393-402
- [2] J. Eleanor Gibson; Richard D. Walk. "The "Visual Cliff"". Retrieved 2013-05-13.
- [3] Whitney SL, Jacob RG, Sparto PJ, Olshansky EF, Detweiler-Shostak G, Brown EL, Furman JM. Acrophobia and pathological height vertigo: indications for vestibular physical therapy?. *Physical Therapy*. 2005 May 1;85(5):443-58.
- [4] Herdman SJ. Vestibular rehabilitation. *Current opinion in neurology*. 2013 Feb 1;26(1):96-101.
- [5] Coelho CM, Silva J, Pereira AF, Sousa EA, Taephant N, Pisitsungkagarn K, Santos JA. Visual-vestibular and postural analysis of motion sickness, panic, and acrophobia.