# Accelerating Recovery: Vibration Therapy Approach Along with Conventional Therapy in Knee Unhappy Triad" A Case Study

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Publication Date: 2025/04/25

#### Abstract

# **Background**:

Unhappy Triad is a severe knee injury which involves injury to the Anterior Cruciate ligament, Medial Collateral Ligament and Medial Meniscus with prevalence of 15.3% in non-contact sports and 34.2% in contact sports, which further impacts the physical abilities and sports performance.<sup>1</sup> Vibration Therapy Device (VTD) is an adjunct to rehabilitate the patients with prolonged immobility, disuse, muscular pain and proven to be effective.<sup>2</sup> As there is paucity of literature on effect of VTD in complex, terrible knee injuries, hence this case study was conducted on effectiveness of Vibration Therapy Device on rehabilitation in a patient with Unhappy Triad.

#### > Objective:

To assess the impact of Vibration Therapy Device on pain, range of motion (ROM) of knee joint, and functional performance, in a patient with Unhappy triad.

#### > Methods:

After Ethical Approval from Institutional Ethical Committee, the reported case with no significant medical history, was selected for the study. Baseline assessment was carried out for Pain, Range of Motion and Functional Outcome. The intervention involved VTD applied on the quadriceps, hamstrings, IT Band and calf muscles Thrice a week for total 12 weeks, alongside a standard rehabilitation program.

#### > Results:

After 12 weeks of, VTD the patient demonstrated significant pain reduction, increased knee ROM and Enhanced functional mobility.

#### > Conclusion:

Vibration Therapy Device, when integrated with standard rehabilitation, showed reduction in pain and improvement in range of motion and functional outcomes, in a patient with Unhappy triad. These findings suggest that vibration therapy along with conventional therapy will be a valuable adjunct in knee injury rehabilitation.

Keywords: Pain, Knee, Unhappy Triad, Range of Motion, Vibration Therapy Device.

**How to Cite:** Dr. Aishwarya Ganjale; Dr. Pradeep Borkar (2025), Accelerating Recovery: Vibration Therapy Approach Along with Conventional Therapy in Knee Unhappy Triad" A Case Study. *International Journal of Innovative Science and Research Technology*, 10(4), 1340-1342. https://doi.org/10.38124/ijisrt/25apr730

# I. INTRODUCTION

In 1936 Campbell asserted that "impairment of the anterior crucial and mesial ligaments is associated with injuries of the internal cartilage". He later stated that "these ligaments are commonly ruptured by the same mechanism

which injures the medial cartilage. O'Donoghue in 1950 called attention to "that unhappy triad rupture of the medial collateral ligament, damage to the medial meniscus, and rupture of the anterior cruciate ligament"(1)Literature has shown prevalence of 15.3%, and 34.2% injuries in non-contact and contact sports respectively, which further

#### Volume 10, Issue 4, April – 2025

https://doi.org/10.38124/ijisrt/25apr730

# ISSN No:-2456-2165

impacts the physical abilities and sports performance.(2)The common mechanisms for ACL injuries are Rotation in knee (pivoting) on the planted foot for 78% of all ACL injuries.(3) Forceful hyperextension of the knee.(3)Women are at a higher risk of ACL injuries, which is a key component of the unhappy triad. The reasons include -Anatomical and Neuromuscular differences and Hormonal influences.(4) Vibration Therapy Device (VTD) are hand held mechanical devices that are electric or battery powered and utilize different shaped applicator tips. (5)These devices are used as percussive therapy, achieved by the rapid tip movement, to deliver bursts of vibration to the myofascial tissues (i.e., fascia, muscle belly or tendon), and proven to be effective in promoting blood flow and reduce myofascial restriction.(4)As there is paucity of literature on effect of VTD on mobility of knee in complex, knee injuries, hence this case study was conducted on effectiveness of Vibration Therapy Device along with the conventional therapy regimen on rehabilitation in a patient with Unhappy Triad.

# II. CASE STUDY

After Ethical Approval from Institutional Ethical Committee, the reported case of 35-year-old female diagnosed with unhappy triad was selected for the study. She had a history knee twist and fall, while descending stairs. She experienced pain in the knee joint. On MRI findings she was diagnosed with unhappy Triad. She was prescribed with NSAIDS and pain killer and was referred to the Physiotherapy Department for further management. At week 0 assessment she had 7/10 NPRS, dull aching pain on her left knee joint at the anterior aspect. Pain aggravated during walking and ascending stairs.

# III. INTERVENTION

> Conventional Exercises

- Static Quads- 10 reps x 2 sets
- Static Hams -10 reps x 2 sets
- Active Range of Motion Exercises of knee joint -10 reps x 2 sets
- Dynamic Quads -10 reps x 2 sets
- 3-way SLR 10 reps x 2 sets

#### ➢ Vibration Therapy

- **Frequency**: 3 times per week
- **Duration**: 30-60 seconds per muscle group
- Intensity: Low to medium speed (20-30 Hz,)
- **Application**: Slow, gliding motions along the muscle belly (not on tendons or joints)

- Direction: proximal progressing towards the distal
- Targeted Muscle Group Quadriceps, Hamstrings, Calf



Fig 1 Vibration Therapy Device



Fig 2 Vibration Therapy Approach to Patient

Table T Outcomes						
Sr. No.	Outcome	Outcome measure	Week 0	Week 4	Week 8	Week 12
1	Pain	Numerical Pain Rating Scale	7	6	4	1
2	Range of Motion	Goniometry (Knee Flexion)	70	90	120	135
3	Functional Status	Lyshlom knee scoring scale	35	53	63	95

ISSN No:-2456-2165

International Journal of Innovative Science and Research Technology

https://doi.org/10.38124/ijisrt/25apr730













# V. DISCUSSION

Regarding the performance-related studies massage guns achieved mixed results, and among the different outcomes explored, these devices appear to be effective in improving ROM and flexibility. After a 2 min at 40 Hz massage gun application, improvements were found.

When Vibration Therapy is applied to the muscle belly it activates the muscle fibers and induces a tonic vibration

reflex, which involves the sustained contraction of the vibrated muscle and relaxation of its antagonist.(6)

This stimulation further promotes excitability in the muscle spindles afferent nerve fibers and these impulses are transmitted to the spinal cord and are believed to trigger an analgesic effect, as suggested by the gate control theory of pain. (7)This theory suggests vibration causes a more closed position of the 'gate', thereby reducing the sensation of pain which results in increased functional outcomes.(8)

# VI. CONCLUSION

Vibration Therapy Device, when integrated with standard rehabilitation, showed reduction in pain and improvement in range of motion of knee and functional outcomes, in a patient with Unhappy triad. These findings suggest that vibration therapy along with conventional therapy will be a valuable adjunct in knee injury rehabilitation.

# **DECLARATION BY AUTHORS**

# Ethical Approval: Approved

#### Acknowledgement: None

**Source of Funding:** The Vibration Therapy Device was funded by Sports Physiotherapy Department, APJ Abdul Kalam College of Physiotherapy, Loni

**Conflict of Interest:** The authors declare no conflict of interest.

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