

# Retrospective Survey of Indian Patient Satisfaction in Immersive Virtual Reality with AI based Motion Sensor Therapy: Feasibility and Acceptance Insights and Implications

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## Abstract

**Background:** Virtual Reality (VR) therapy is an emerging innovation in Indian healthcare, showing promise in the rehabilitation of neurological, chronic pain, pediatric rehabilitation and orthopedic conditions. While clinical effectiveness is being increasingly documented, limited attention has been paid to patient satisfaction, an essential component for optimizing therapeutic interventions and outcomes.

**Objective:** This study aims to retrospectively assess patient satisfaction with Immersive VR therapy among Indian patients receiving rehabilitation for neurological and orthopedic conditions.

**Methods:** A retrospective survey was conducted with 35 patients from two physiotherapy outpatient centers in Tamil Nadu, India. Eligible patients had undergone at least five sessions of VR therapy between November 2024 and February 2025. A 10-item questionnaire based on a 5-point Likert scale was administered in English and Tamil, capturing various dimensions of satisfaction.

**Results:** Most patients found VR therapy effective (74%), with 85% reporting symptom improvement and 77% noting functional gains. Additionally, 82% considered it as effective or more effective than traditional therapy. The therapy was perceived as comfortable (90%), engaging (79%), personalized (79%), and easy to understand (87%). Overall satisfaction was high (77%).

**Conclusion:** The study highlights high patient satisfaction with VR therapy in an Indian rehabilitation setting. Results support its feasibility and relevance in enhancing engagement, comfort, and functional outcomes. These findings lay the groundwork for broader integration of VR in physiotherapy.

**Keywords:** Virtual reality therapy, Patient satisfaction, AI - based motion sensor, Chronic pain, Stroke, VR survey

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## Introduction

The integration of virtual reality (VR) technology into therapeutic practices represents a groundbreaking advancement in modern healthcare in India. VR has emerged as a promising treatment approach for patients undergoing rehabilitation like neurological, chronic pain, orthopedic, pediatric and cardiopulmonary conditions<sup>(1,2)</sup>. By leveraging the principles of interaction, immersion, and engagement, VR therapy enhances patient motivation and adherence to rehabilitation protocols. This innovative approach not only complements traditional therapy methods but also offers a unique and effective means of improving the overall therapeutic experience and clinical outcomes<sup>(3)</sup>.

Patient satisfaction is a crucial clinical metric for evaluating the effectiveness and acceptability of therapeutic interventions. High levels of satisfaction often correlate with better adherence to treatment protocols, improved clinical outcomes, and enhanced quality of care. Despite the growing adoption of VR therapy, understanding the patient experience and satisfaction levels is essential to optimize VR therapy protocols, ensure patient-centric care, and guide future innovations in this rapidly evolving field. The insights derived from this analysis will provide valuable guidance for healthcare providers, helping them to design and implement VR therapies that are more effective, user-friendly, and patient-centered. It also seeks to identify patient acceptance and satisfaction.

This retrospective analysis aims to fill this gap by examining patient satisfaction data from patients who have participated in the VR therapy program. It will explore various dimensions of satisfaction, including the usability of VR therapy, the perceived effectiveness of therapy, and overall patient experiences. A thorough review of the current literature reveals no previous studies that have systematically investigated patient satisfaction with virtual reality therapy in India, positioning this study as the first of its kind.

## Materials and Methods

### Study Design

This study was designed as a retrospective cross-sectional survey aimed at evaluating patient satisfaction with Virtual Reality (VR) therapy in an Indian clinical context.

### Survey Development

The survey questionnaire was developed by clinical physiotherapists from the Rewin Team. It was reviewed for content validity by a panel of three experienced clinicians, two internal physiotherapists and one external physiotherapy expert. The final survey consisted of 10 questions covering multiple dimensions, including:

- Satisfaction with VR therapy
- Usability of VR systems
- Acceptance of VR in rehabilitation
- Patient-perceived benefits
- Overall engagement and experience

To ensure accessibility, the survey was administered through Google Forms and made available in both English and Tamil, the regional language of Tamil Nadu.

### Participant Criteria

#### Inclusion Criteria

- Patients aged 10+ with neurological or orthopedic conditions who completed  $\geq 5$  VR sessions.

#### Exclusion Criteria

- Severe cognitive impairments or contraindications to VR (e.g., epilepsy).

### Sampling Method

A random sample of patients who underwent a minimum of five VR therapy sessions for various clinical conditions was selected for participation in the study.

### Duration and Timeline

Patients included in the study had undergone VR therapy between November 2024 to February 2025. Data collection was carried out during and immediately following this treatment period.

### Ethical Considerations

Prior to participation, all respondents provided informed consent, affirming their voluntary agreement to participate in the study. As this was a non-invasive, survey-based study involving no clinical interventions, no specific ethical clearance was obtained.

### Data Collection

The survey was distributed through multiple channels to maximize response rates, including:

- Direct interactions with outpatients following their therapy sessions
- Phone calls to eligible patients

Data was collected from two outpatient Physiotherapy centers

- 10 responses from Ciranjev Rehab Centre, Chidambaram
- 25 responses from the Rewin Health Physiotherapy Clinic, Chennai

### Results

#### Patients Demographics

A total of 35 patients were enrolled in the VR therapy satisfaction survey. Of these, 23 patients were undergoing therapy for neurological conditions, while 12 patients were receiving therapy for orthopedic conditions (refer table.1)

**Table 1 Distribution by Clinical Category**

Clinical Category	No. of patients
Neurological	23
Orthopedic	12
Total	35

### Age Distribution

Patients ranged in age from under 10 years to over 80 years. Most respondents were aged between 51 and 70 years (refer table.2)

**Table 2. Age Distribution of patients**

Age Group	No. of patients
10 Yrs	1
11-20 yrs	2
21-30 yrs	2
31-40 yrs	4
41-50 yrs	4
51- 60 yrs	8
61-70	10
71-80	2
81-90	2

### Clinical Condition

The types of neurological and orthopedic conditions are detailed in table 3.1 & 3.2.

**Table 3.1. Neuro Conditions**

Conditions	No. of patients
Behavioral therapy	1
Brain Tumor	1
Essential Tremor	1
GBS	2
Left hemiplegia	8
Right hemiplegia	8
Parkinson's	1
Neuromuscular	1

**Table 3.2. Orthopedic conditions**

Conditions	No. of patients
Left Knee OA	3
Right Knee OA	6
Hip muscle weakness	1
Post OP TKR	1
Neck pain	1

## Distribution of Clinical Conditions

### VR Therapy Survey Analysis

A 10-item survey was administered to 35 patients to assess their experiences with VR therapy. Each

item on the survey utilized a 5-point Likert scale, with response options ranging from “Strongly Disagree” to “Strongly Agree” (refer Table 4).

**Table 4. Frequency Distribution of VR Therapy Survey Responses**

S. No	Survey Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	How helpful was VR therapy in addressing your concerns/ goals?	2%	5%	17%	34%	40%
2	How comfortable did you feel during VR therapy sessions?	0%	0%	8%	48%	42%
3	How would you rate your level of engagement during VR therapy?	0%	2%	17%	25%	54%
4	Do you think VR therapy would benefit others with similar conditions?	0%	8%	11%	25%	54%
5	How was VR therapy compared to traditional therapy?	0%	0%	17%	37%	45%
6	Did you notice improvements in your condition/symptoms after VR therapy?	2%	0%	11%	34%	51%
7	Was VR therapy personalized to your needs/preferences?	2%	2%	14%	28%	51%
8	Did VR therapy help you improve your functional goals?	0%	5%	17%	37%	40%
9	Were you able to understand the VR therapy instructions?	5%	0%	5%	25%	62%
10	Overall, how satisfied are you with your VR therapy experience?	2%	0%	20%	31%	45%

To enable a more structured interpretation of the results, the frequency of responses for each option was converted into percentages, reflecting the proportion of patients selecting each response. These percentages offer a clearer understanding of the distribution across the different Likert scale categories. Furthermore, the findings were categorized and analyzed based on the focus of each individual survey item, allowing for targeted insights into specific aspects of the VR therapy experience.

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### 1. Perceived Helpfulness of VR Therapy

A significant proportion of patients (74%) found VR therapy either “Agree” (34%) or “Strongly Agree” (40%) in addressing their concerns and goals (refer table.4).

### 2. Patient Comfort during VR therapy:

The majority of patients (90%) expressed a high level of comfort. The absence of any patients who disagreed or strongly disagreed suggests that comfort was a prominent feature of the VR therapy experience (refer table.4).

### 3. Patient Engagement Levels During VR Therapy

A large majority (79%) of patients reported feeling engaged during the VR therapy, with 54% strongly agreeing and 25% agreeing (refer table.4).

### 4. Perceived Benefits of VR Therapy for Patients with Similar Conditions

About 80% believed that VR therapy could also benefit others with similar conditions, reinforcing its broader applicability and relevance (refer table.4).

### 5. Effectiveness of VR therapy compared to traditional therapy

More than 82% rated VR therapy as equally or more effective than traditional rehabilitation methods, suggesting a favorable perception in terms of clinical value (refer table.4).

### 6. Patient Recovery Following VR therapy

85% reported noticeable improvements in their symptoms, reinforcing the potential clinical efficacy of VR-based interventions (refer table.4).

### 7. Personalization of VR therapy to patient needs

Around 79% agreed that the therapy was tailored to their needs, highlighting the adaptability and customized approach of the sessions (refer table.4).

### 8. Functional improvements with VR therapy

77% observed functional improvements, supporting the role of VR in helping patients meet specific recovery goals (refer table.4).

### 9. Understanding VR Therapy Instructions

A high 87% found the instructions easy to understand, demonstrating the accessibility of the therapy interface (refer table.4).

### 10. Satisfaction with VR Therapy Experience

General satisfaction was strong, with over 77% of patients expressing a positive experience (refer table.4).

## Discussion

This retrospective survey provides valuable insights into patient satisfaction with Virtual Reality (VR) therapy among Indian patients with neurological and orthopedic conditions. The findings underscore the generally positive reception of VR therapy, particularly in terms of patient comfort, engagement, and perceived therapeutic benefits.

### 1. Perceived Helpfulness of VR Therapy

In the present study, 73% of patients indicated a positive perception of the helpfulness of virtual reality (VR) therapy in addressing their individual rehabilitation goals and concerns. While numerous high-quality systematic reviews incorporating randomized controlled trials have demonstrated that the addition of VR to conventional therapy yields significant improvements in upper limb function, balance, gait, and cognition following stroke, there is a notable absence of evidence regarding patients' subjective experiences and perceived benefits of VR therapy<sup>(4)</sup>. This study represents the first known investigation specifically aimed at exploring patients' perspectives on the perceived helpfulness of VR therapy in the context of post-stroke rehabilitation.

### 2. Patient Comfort during VR therapy

In this study, 90% of patients reported a high level of comfort while using the virtual reality (VR) headset, indicating strong acceptance and tolerability of the technology in a rehabilitation setting. While existing literature supports the use of VR for clinical testing—such as visual

field assessments with real-time eye tracking – and confirms its general acceptability and feasibility, most of this evidence pertains to diagnostic or remote monitoring contexts<sup>(5)</sup>. To date, there is limited evidence addressing patient comfort and acceptance of VR specifically within rehabilitation. This study helps to bridge that gap, highlighting the importance of evaluating not only clinical efficacy but also patient experience when implementing VR in therapeutic settings.

### **3. Patient Engagement Levels During VR Therapy**

In this study, 79.7% of patients reported feeling engaged during VR therapy, underscoring the importance of engagement as a key factor in patient experience. Engagement appears to function as a crucial intermediary between an individual's tendency for immersion, their sense of spatial presence, and the resulting emotional responses. Patients who demonstrated higher levels of immersion and engagement within the virtual environment experienced notable emotional improvements. The findings are consistent with prior research that identifies engagement as a crucial element in achieving the psychological benefits of VR-based interventions, particularly in cancer care settings<sup>(6)</sup>. Notably, engagement should be recognized as a key indicator to overall patient satisfaction in the context of VR-based rehabilitation.

### **4. Perceived Benefits of VR Therapy for Patients with Similar Conditions**

The willingness of patients to recommend VR therapy to others with similar conditions serves as a significant indicator of both patient satisfaction and the perceived efficacy of the intervention. Patients who undergo VR therapy often report experiencing meaningful benefits directly addressing their specific symptoms, such as anxiety, distress, pain, or motor impairment which in turn fosters confidence in endorsing the treatment to peers facing comparable challenges. Notably, a substantial

proportion of patients (79.7%) express the belief that VR therapy would be beneficial for others with similar conditions, with over half strongly affirming this view. This positive perception is well-supported by research demonstrating consistently high patient satisfaction and a readiness to recommend VR therapy across diverse clinical populations, including those with anxiety disorders, psychosis, and chronic pain<sup>(7)</sup>.

### **5. Effectiveness of VR therapy compared to traditional therapy**

The effectiveness of VR therapy, when compared to traditional therapeutic approaches, has been increasingly supported by patient-reported outcomes and clinical studies. In the present study, 82% of patients perceived VR therapy to be more effective than conventional therapy alone. This subjective perception aligns with existing evidence demonstrating the added value of VR-based interventions in physical rehabilitation. For instance, studies have shown that integrating VR with conventional therapy produces moderate improvements in balance outcomes among post-stroke patients, surpassing the results of conventional therapy alone<sup>(3)</sup>. Similarly, in individuals with Parkinson's disease (PD), VR-based rehabilitation has been associated with significantly greater improvements in balance and gait performance compared to traditional physical therapy<sup>(8)</sup>. These findings suggest that VR therapy not only enhances patient engagement but may also amplify therapeutic outcomes.

### **6. Patient Recovery Following VR therapy**

Most patients in the present study (85%) reported noticeable improvements in motor symptoms and a reduction in pain following VR therapy, particularly in neurological and orthopedic conditions. These self-reported outcomes are consistent with existing evidence supporting the therapeutic benefits of VR in rehabilitation settings. A systematic review

and meta-analysis focusing on post-stroke rehabilitation found that VR interventions significantly improve motor function and quality of life. This is largely attributed to task-specific and goal-oriented activities delivered through immersive environments, which stimulate neuroplasticity and facilitate functional recovery<sup>(2)</sup>. Similarly, in orthopedic contexts such as knee osteoarthritis (KOA), VR-based exercise therapy has demonstrated promising results. Studies have shown that VR interventions significantly reduce pain and improve muscle strength, as well as enhance the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) total scores in KOA patients<sup>(9)</sup>. However, while reductions in pain and improvements in general function are evident, changes in joint stiffness and specific physical function metrics have been less pronounced. These findings suggest that VR therapy holds considerable potential as an adjunct to traditional rehabilitation, particularly for enhancing pain management and motor recovery.

#### **7. Personalization of VR therapy to patient needs**

Personalization is a critical factor in the success of VR-based rehabilitation. In the present study, 79% of patients reported that their VR therapy was tailored to their individual needs and medical conditions. This finding aligns with current best practices in rehabilitation and pain management, where customizing interventions are essential for optimizing therapeutic outcomes. Existing literature emphasizes that tailoring virtual environments to match patient-specific abilities and goals can significantly enhance engagement, attention, and motivation<sup>(10)</sup>. Neurorehabilitation experts further recommend adjusting the level of stimuli, incorporating realistic tasks with timely feedback, and monitoring fatigue throughout the therapy process. Such personalized approaches are believed to support more effective recovery and facilitate the transfer of skills to real-world settings.

#### **8. Functional improvements with VR therapy**

In the present study, 77% of patients reported improvements in their functional goals following VR therapy. These findings are supported by existing literature indicating that VR interventions can enhance functional outcomes in various rehabilitation contexts. Systematic reviews have shown that VR therapy contributes to improved treatment adherence and increased pain tolerance, while also supporting the achievement of key rehabilitation endpoints such as enhanced range of motion, functional performance, and overall functional measures, particularly in individuals with chronic pain<sup>(1)</sup>. These results suggest that VR can be an effective tool for promoting functional recovery alongside symptom management.

#### **9. Understanding VR Therapy Instructions**

A vast majority of patients (87.1%) in the present study reported that the instructions provided during VR therapy were clear and easy to understand. This finding reflects a high level of usability, which is essential for patient engagement, adherence, and the overall success of digital health interventions. While previous research has emphasized the importance of user-friendly design and intuitive interfaces in VR-based rehabilitation, there is limited empirical evidence specifically evaluating patients' understanding of VR therapy instructions. To our knowledge, this is among the first studies to directly explore patients' perceptions of instruction clarity within therapeutic VR applications. These findings highlight the value of accessible, well-structured guidance in supporting independent task execution and optimizing rehabilitation outcomes in VR environments.

#### **10. Satisfaction with VR Therapy Experience**

This study found a high level of satisfaction with the VR therapy experience, with 77.1% of patients reporting positive responses—45.7% strongly agreed and 31.4% agreed. In the context of rehabilitation, patient satisfaction

is a key indicator of intervention success, as it directly influences motivation, adherence, and continuity of care. The immersive and interactive nature of VR likely contributes to this positive experience, making therapy more engaging and less monotonous than traditional approaches. These results add to the growing body of evidence positioning VR therapy as not only clinically effective but also patient-centered and well-tolerated, particularly within neurological and orthopedic rehabilitation frameworks.

### Conclusion

This retrospective analysis is among the first of its kind to assess patient satisfaction with Virtual Reality therapy in an Indian clinical context. The findings indicate that VR therapy is not only well-accepted but also perceived as effective by patients across neurological and orthopedic rehabilitation domains. Although clinical assessments were conducted, their analysis lies beyond the scope of the present study. High levels of comfort, engagement, and clarity of instruction contributed significantly to the overall positive experience. The study reaffirms the value of VR as a complementary tool in rehabilitation, particularly for enhancing patient motivation, personalizing care, and potentially improving functional outcomes.

Patient satisfaction emerged as a crucial indicator of VR therapy's feasibility and relevance in routine physiotherapy practice. These results underscore the need to continue refining VR applications with a patient-centric focus, ensuring accessibility, personalization, and user-friendliness.

### Limitations

This study's small sample size and retrospective design limits generalizability and may introduce recall bias. Data were collected from only two centers in Tamil Nadu, which may not represent the wider Indian population. The lack of a control group and reliance on self-reported measures restrict

comparison with traditional therapy and the age distribution of participants was not analyzed.

### Way Forward

Future research should focus on larger scale, multicentric studies across diverse regions of India to enhance the generalizability of findings and capture demographic variations in patient satisfaction with VR therapy. Integrating patient satisfaction data with objective clinical outcome measures—such as range of motion, pain scores, and mobility indices—will provide a more comprehensive evaluation of VR therapy's effectiveness. Additionally, developing condition-specific VR content, incorporating localized and multilingual options, will improve usability and cultural relevance, facilitating wider adoption. Standardized training protocols for therapists and clear clinical guidelines should be established to ensure consistent and effective VR therapy delivery.

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