

Awareness and Perspectives on Sports-Specific Telerehabilitation Among Physiotherapy Students in Andhra Pradesh: A Cross-Sectional Web-Based Survey

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Abstract: *Telerehabilitation is increasingly used to extend rehabilitation services through digital communication and remote-care technologies, including sports rehabilitation. This cross-sectional study assessed awareness, formal educational exposure, and perspectives on sports-specific telerehabilitation among physiotherapy students in Andhra Pradesh, and examined associations with selected participant characteristics. A structured web-based questionnaire was completed by 100 undergraduate, postgraduate, and PhD physiotherapy students from the Sri Venkateswara University (SVU) and Andhra University (AU) academic regions. Overall, 81% of participants were familiar with telerehabilitation. Among participants who were familiar with the term, the undergraduate physiotherapy curriculum was the most frequently reported first source of exposure (47.5%), followed by research articles or journals (23.8%). Only 40% reported receiving formal curricular education, which was mainly limited to basic concepts. Among participants without formal education who answered the follow-up question, lack of time or resources was the most frequently reported reason (47.9%), followed by preference for traditional face-to-face rehabilitation (27.1%). Familiarity was significantly associated with stable internet connectivity ($p = 0.001$), but not with gender, region, academic level, or age group. The mean 11-item perspective score was 35.25 ± 4.35 out of 55, with no significant differences across the demographic and access-related groups examined. These findings indicate a gap between general awareness and structured educational exposure. Integrating clinically oriented telerehabilitation competencies into physiotherapy education may help students understand appropriate applications, limitations, and safe transitions between remote and face-to-face care.*

Keywords: Telerehabilitation; sports physiotherapy; physiotherapy students; digital health; physiotherapy education; awareness; Andhra Pradesh

1. Introduction

Telerehabilitation refers to the remote delivery of rehabilitation services through information and communication technologies, including video consultations, mobile applications, wearable devices, and digital platforms. It can support assessment, treatment, monitoring, education, and follow-up without requiring the patient and therapist to be physically present at the same location. Its use expanded substantially during the COVID-19 pandemic and continues to offer potential advantages in accessibility, reduced travel burden, cost, and continuity of care, particularly for people in rural or resource-limited settings. [1,2]

Within physiotherapy education and clinical practice, the increasing use of digital health makes preparation for remote care relevant to future clinicians. Andhra Pradesh, with physiotherapy institutions associated with universities including Sri Venkateswara University (SVU) and Andhra University (AU), provides a regional setting in which student awareness and readiness for this mode of practice can be examined.

Previous studies among physiotherapy students have reported moderate-to-high awareness of telerehabilitation, limited formal curricular exposure, and generally positive views accompanied by concerns about practical skills, technology access, and the role of traditional face-to-face care. [3,4] The

present study therefore focused specifically on sports-related telerehabilitation within this regional student population. Understanding students' awareness, sources of knowledge, formal educational exposure, and perspectives may help inform curriculum development and future clinical training.

The present study therefore assessed awareness and perspectives regarding sports-specific telerehabilitation among physiotherapy students in Andhra Pradesh, identified sources of knowledge and barriers to formal education, examined associations between familiarity with telerehabilitation and selected participant characteristics, and compared perspective scores across demographic and access-related groups.

Aim

To assess awareness and perspectives regarding sports-specific telerehabilitation among physiotherapy students in Andhra Pradesh.

Objectives

- To determine the proportion of physiotherapy students in Andhra Pradesh familiar with telerehabilitation.
- To identify the major sources through which students were first exposed to telerehabilitation.
- To determine the extent of formal curricular education in telerehabilitation.

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- To examine the association between familiarity with telerehabilitation and selected demographic or access-related variables.
- To describe students' perspectives regarding the benefits and limitations of sports-specific telerehabilitation and compare the composite perspective score across selected participant characteristics.

2. Methodology

Study design and setting

A cross-sectional, web-based survey was conducted among physiotherapy students associated with the SVU and AU academic regions of Andhra Pradesh. Data were collected electronically from 29 July 2026 to 14 August 2026 using an online questionnaire.

Participants and sampling

A non-probability convenience sampling approach was used. The final dataset contained 100 complete responses suitable for analysis. Participants included undergraduate, postgraduate, and PhD-level physiotherapy students. Inclusion required current enrolment in a physiotherapy programme, voluntary participation, and completion of the online questionnaire. Because convenience sampling was used and participants were drawn from two academic regions, the sample should be interpreted as a regional student sample rather than as representative of all physiotherapy students in India.

Survey instrument

A structured, self-administered questionnaire was developed for this study based on a review of previous literature [3,4] and with guidance from the project guide, who reviewed the questionnaire before its distribution. No pilot testing was conducted, and formal psychometric validation was not undertaken. The questionnaire included demographic and access variables, familiarity with telerehabilitation, source of first exposure, formal curricular education, and 11 statements concerning perceived benefits and limitations of sports-specific telerehabilitation. The 11 perspective statements used a five-point Likert response format ranging from strongly disagree to strongly agree. The statements addressed access to sports physiotherapy; travel time and financial burden; follow-up assessment; access to remote or underserved athletes; progression of sport-specific exercise; communication and collaboration; digital assessment and return-to-play decision-making; technical limitations; limitations of hands-on assessment; the need for additional training; and the effect of reduced physical interaction on athlete satisfaction.

Data Collection Procedure

The questionnaire was distributed through the investigators' available student networks. Participation was voluntary. Respondents were informed about the purpose of the study before providing informed consent. Consent was obtained electronically from participants in the AU region and in person from participants in the SVU region.

Ethical considerations: The authors report that formal institutional ethics committee approval was not required for

this study. Participation was voluntary, and informed consent was obtained from all participants before data collection.

Statistical Analysis

Data were exported from the online survey into Microsoft Excel and analysed using descriptive and inferential statistics. Age was summarized as mean $\pm$ standard deviation and range. Categorical variables were summarized using frequencies and percentages. Familiarity with telerehabilitation was analysed as a binary outcome (yes/no). Chi-square tests of association were used to examine relationships between familiarity and gender, region, academic level, internet connectivity, and age group. For age-group analysis, participants were categorized as ≤ 20 , 21–23, and ≥ 24 years. Likert-scale perspective items were coded from 1 (strongly disagree) to 5 (strongly agree). Five negatively framed statements were reverse coded before calculating the composite perspective score, giving a possible range of 11–55; higher scores therefore represented a more favourable overall perspective after reverse coding. The composite score was summarized as mean $\pm$ standard deviation. Independent-samples t-tests were used for two-category comparisons (gender, region, and internet access), and one-way ANOVA was used for age group and academic level. A two-sided p-value < 0.05 was considered statistically significant.

3. Results

Participant characteristics

The study included 100 participants. Most participants were aged 21–23 years (51%) or ≥ 24 years (43%), while 6% were ≤ 20 years. Seventy-eight participants (78%) were female and 22 (22%) were male. The mean age was 23.48 ± 2.86 years, with ages ranging from 19 to 40 years. Sixty-four participants (64%) belonged to the SVU region and 36 (36%) to the AU region. Most participants were undergraduate students (76%), followed by postgraduate students (21%) and PhD students (3%). Stable internet connectivity was reported by 85% of participants.

Familiarity with telerehabilitation

Eighty-one participants (81%) reported that they were familiar with the term telerehabilitation and its applications, whereas 19 (19%) were not. Among the 81 familiar participants, 80 provided a source of first exposure. The most frequently reported source was the undergraduate physiotherapy curriculum (38/80, 47.5%), followed by research articles or journals (19/80, 23.8%), workshops/conferences/seminars (14/80, 17.5%), clinical posting/internship (7/80, 8.8%), workplace exposure (1/80, 1.3%), and inference from the term itself (1/80, 1.3%).

Formal Curricular Exposure

Forty participants (40%) reported receiving formal education on telerehabilitation as part of their curriculum, whereas 60 (60%) reported no formal education. Among the 40 participants reporting formal education, basic concepts were the most frequently reported component (38/40, 95.0%), followed by technologies and digital platforms (9/40, 22.5%) and communication skills for remote consultations (6/40, 15.0%). Respondents could select multiple options for this item.

Among the 60 participants who reported no formal education, 48 provided a response concerning reasons for not receiving or not seeking such education. Lack of time or resources was the most frequently selected reason (23/48, 47.9%), followed by preference for traditional face-to-face rehabilitation (13/48, 27.1%) and the belief that the current curriculum was already sufficient (9/48, 18.8%). Three respondents provided other curriculum-related responses. Because 12 participants did not answer this follow-up item, these percentages are based on the 48 valid responses rather than all 60 participants without formal education.

Reason among participants without formal education	n	% of valid responses
Lack of time or resources	23	47.9
Preference for traditional face-to-face rehabilitation	13	27.1
Current curriculum considered sufficient	9	18.8
Not included in college curriculum	1	2.1
Would be useful if added to curriculum	1	2.1
Current curriculum does not cover it adequately	1	2.1
Total valid responses	48	100.0

Association between familiarity and participant characteristics

Familiarity with telerehabilitation was significantly associated with access to stable internet connectivity ($\chi^2 = 11.019$, $p = 0.001$). Familiarity was not significantly associated with gender ($\chi^2 = 0.039$, $p = 0.844$), region ($\chi^2 = 3.146$, $p = 0.076$), academic level ($\chi^2 = 4.553$, $p = 0.103$), or age group ($\chi^2 = 5.484$, $p = 0.064$).

Perspectives on sports-specific telerehabilitation

The 11-item composite perspective score had a mean of 35.25 ± 4.35 out of a possible 55 after reverse coding the five negatively framed items. At the item level, agreement was common for perceived access benefits, reduced travel and financial burden, remote service provision, exercise progression, communication, and the potential contribution of digital assessment tools. At the same time, many participants agreed that technical limitations, lack of hands-on assessment, the need for additional training, and reduced physical interaction could affect sports-specific telerehabilitation. This pattern indicates recognition of both potential benefits and practical limitations rather than viewing telerehabilitation as a complete replacement for conventional care.

The composite perspective score did not differ significantly by gender ($t = 0.526$, $p = 0.600$), region ($t = -1.152$, $p = 0.252$), or stable internet connectivity ($t = 0.465$, $p = 0.643$). One-way ANOVA showed no significant difference by academic level ($F = 0.113$, $p = 0.893$) or age group ($F = 0.093$, $p = 0.911$).

Grouping variable	Group	n	Mean $\pm$ SD	p-value
Gender	Female	78	35.37 ± 4.06	0.600
	Male	22	34.82 ± 5.34	
Region	SVU	64	35.63 ± 4.52	0.252
	AU	36	34.58 ± 4.00	
Stable internet	Yes	85	35.16 ± 4.39	0.643
	No	15	35.73 ± 4.18	
Academic level	UG	76	35.17 ± 4.30	0.893
	PG	21	35.38 ± 4.75	
	PhD	3	36.33 ± 3.79	
Age group	≤ 20	6	36.00 ± 4.00	0.911
	21–23	51	35.20 ± 4.35	
	≥ 24	43	35.21 ± 4.48	

4. Discussion

The present study found that 81% of surveyed physiotherapy students were familiar with telerehabilitation, while only 40% reported receiving formal education on the topic. The difference between familiarity and formal curricular exposure is an important finding. The reported sources of first exposure indicate that familiarity may arise through multiple routes, including university teaching, research literature, workshops, clinical exposure, and other informal sources, rather than through a consistently structured educational pathway.

The proportion reporting familiarity in the present sample (81%) was numerically higher than the 40.4% reported by Başer Seğer and Çeliker Tosun in 2022 and the 65.3% reported by Ramalingam et al. in a 2025 international survey. [3,4] Differences in sampling, questionnaire wording, study setting, educational exposure, and participant characteristics limit direct numerical comparison. Nevertheless, these studies, together with the present findings, indicate that familiarity can coexist with limited formal curricular preparation.

Stable internet connectivity showed the clearest statistical association with familiarity in the present study. Participants with stable internet access were more frequently familiar with telerehabilitation than those without stable access. This association is plausible because exposure to digital health platforms, online learning resources, research literature, and virtual clinical services depends partly on reliable connectivity. However, the cross-sectional design does not establish that internet access causes greater familiarity; familiarity and access may influence each other, and other unmeasured factors may contribute.

Region was not significantly associated with familiarity with telerehabilitation ($\chi^2 = 3.146$, $p = 0.076$), indicating that familiarity did not differ significantly between students from the SVU and AU regions in this sample.

The findings concerning formal education are consistent with the broader educational literature. Baroni et al. identified assessment, communication, technology use, safety, and therapeutic prescription as important components of telerehabilitation practice and highlighted curriculum development as an important need. [5] Anil et al. similarly identified clinical reasoning, communication, technology, person-centred care, remote assessment and intervention, privacy, security, patient safety, and professionalism as relevant telehealth competencies, while noting that these

competencies have not been consistently implemented in education. [6]

The perspective findings show that students recognized both the potential usefulness and the limitations of sports-specific telerehabilitation. Agreement was common for improved access, reduced travel burden, remote service delivery, exercise progression, and communication. At the same time, participants recognized technical limitations and the reduced ability to perform hands-on assessment. Systematic reviews indicate that real-time telerehabilitation can be effective for several musculoskeletal conditions and can provide outcomes comparable with standard practice in appropriate contexts, although effectiveness varies by condition and delivery model. [7,9] Evidence from a systematic review of real-time video telerehabilitation suggests similar satisfaction and potentially comparable or higher attendance and adherence than in-person physiotherapy; however, the certainty of evidence ranged from very low to low. [9] These findings support a selective, clinically appropriate approach rather than treating telerehabilitation as a universal substitute for face-to-face care.

The absence of statistically significant differences in composite perspective scores across gender, region, internet access, age group, and academic level suggests that the broad pattern of views was relatively consistent within this sample. This should not be interpreted as evidence that demographic characteristics never influence attitudes; the sample size, particularly the small postgraduate and PhD subgroups, limits the ability to detect small between-group differences.

In this sample, only 40% of students reported formal curricular exposure to telerehabilitation, despite 81% being familiar with the term. Physiotherapy education could therefore incorporate clinically oriented content covering case selection, remote subjective and objective assessment, exercise prescription and progression, communication, documentation, privacy and consent, digital safety, emergency procedures, and appropriate transition between remote and face-to-face care. These areas are consistent with competency domains identified in the allied health literature. [6]

The evidence base supports a balanced approach to implementation. Systematic reviews have reported that telerehabilitation can be effective for several musculoskeletal conditions and may reduce time or cost in appropriate circumstances, but results vary by condition and delivery model and are not uniformly superior to face-to-face rehabilitation. [7,8,9] Student education should therefore emphasize clinical appropriateness, patient safety, and the limitations of remote assessment rather than presenting telerehabilitation as a universal replacement for in-person physiotherapy.

5. Conclusion

Among the 100 physiotherapy students surveyed from the SVU and AU academic regions of Andhra Pradesh, familiarity with telerehabilitation was relatively high (81%), whereas only 40% reported formal curricular education. Stable internet connectivity was significantly associated with

familiarity, whereas gender, region, academic level, and age group were not. Composite perspectives on sports-specific telerehabilitation did not differ significantly across the demographic and access-related groups examined. Incorporating practical, clinically oriented telerehabilitation competencies into physiotherapy education may help students understand appropriate uses, limitations, and safe transitions between remote and face-to-face sports rehabilitation.

6. Limitations

- The study used non-probability convenience sampling, which limits generalizability beyond the participating student population.
- The sample size was 100, with relatively small postgraduate and PhD subgroups; therefore, some between-group comparisons had limited statistical power.
- The study was conducted in two academic regions of Andhra Pradesh and should not be interpreted as representative of all physiotherapy students in India.
- The questionnaire was self-reported and may be affected by recall, interpretation, or social-desirability bias.
- The survey measured familiarity and perspectives rather than objective clinical competence in delivering telerehabilitation.
- The questionnaire was informed by previous literature but was not established in the available study records as a fully validated psychometric instrument. Formal reliability and construct-validity testing should be undertaken before the instrument is used as a standardized measure in future research.
- The cross-sectional design identifies associations but cannot establish causal relationships, including the relationship between internet access and familiarity.
- Some follow-up questions had missing responses. In particular, 12 of the 60 participants who reported no formal curricular education did not provide a reason for the follow-up item; these missing responses were retained rather than imputed.

7. Recommendations

- Physiotherapy programs may consider incorporating structured telerehabilitation content addressing case selection, remote assessment, exercise prescription, monitoring, communication, privacy, consent, safety, and documentation.
- Practical teaching methods such as simulated video consultations, case-based learning, remote assessment demonstrations, and supervised digital exercise programs may be incorporated where feasible.
- Teaching should explicitly address when face-to-face assessment is necessary, particularly when hands-on examination, manual intervention, urgent assessment, or high-risk clinical decision-making is required.
- Students' digital health literacy and familiarity with commonly used telehealth and remote-monitoring technologies should be developed alongside clinical reasoning.
- Future studies should recruit larger and more representative samples from multiple institutions and states.

- Future research should use validated questionnaires and report reliability and construct-validity measures before drawing conclusions from composite perspective scores.
- Interventional studies can evaluate whether structured telerehabilitation education improves students' knowledge, confidence, practical competency, and readiness for clinical use.

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