THE SCOPE OF ARTIFICIAL INTELLIGENCE IN FACILITATING DISABILITY REHABILITATION FOR RURAL POPULATION.

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ABSTRACT

Rural Areas have restricted access to healthcare services, creating challenges for care accessibility, quality, and sustainability. This narrative review examines how artificial intelligence (AI) can address these issues by integrating e-health and the Internet of Medical Things (IoMT), enhancing healthcare delivery in under-resourced areas. Additionally, it explores AI's role in advancing medical education and training, thereby supporting the professional development of healthcare workers.

The review highlights AI's potential to bridge gaps in healthcare delivery, improve rehabilitation processes, and enhance optimal results for individuals with disabilities in rural areas. Objectives include identifying current AI applications in rehabilitation, analyzing their benefits and limitations in rural healthcare systems, and evaluating how AI can enhance the accessibility, quality, and customization of rehabilitation services. A detailed review of the existing literature search was conducted across PubMed, Scopus, and Google Scholar, focusing on studies that explored AI in disability rehabilitation for rural settings.

A systematic literature search was performed in the PubMed Database and Cochrane Central Library, following the Preferred Reported Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The results indicate that AI-driven solutions, such as remote monitoring, personalized rehabilitation programs, and assistive technologies, are making significant advances. AI-powered tools improve patient access, tailor rehabilitation to individual needs, and optimize limited resources.

AI holds substantial potential for transforming disability rehabilitation in rural areas by enhancing care accessibility and personalization. Addressing ethical concerns, and workforce training will be critical to fully realizing AI's potential in these settings. AI-based applications are vital for rural rehabilitation.

Introduction

With the growing need for technological innovations and real-time technical support, Artificial Intelligence (AI) has become a vital component of the healthcare system. AI is defined as advancing technology designed to perform tasks requiring human intelligence. AI integrates various subfields, including Robotics, computer vision, artificial intelligence, and computational linguistics [1]. In the last ten years., the utilization of AI has expanded significantly across diverse domains, ranging from voice assistants integrated into daily life to autonomous vehicles. This expansion is attributed to the remarkable capability of intelligent systems to be trained and autonomously acquire new skills based on prior experiences or input data. Consequently, the application of AI in medical research is receiving heightened attention and extensive exploration. AI-driven systems have demonstrated substantial potential to transform various aspects of medical science, including drug design and discovery, automated segmentation, and extracting relevant information from radiological datasets. Moreover, they have exhibited significant capability in facilitating diagnostic formulation, outcome prediction, and treatment planning across diverse medical disciplines [2]. Artificial intelligence (AI) has the potential to significantly contribute to the decentralization of rehabilitation by integrating intelligent, connected technologies for remote monitoring and assistance. Through the application of computer vision, AI can enhance tele-physiotherapy by tracking and evaluating patient movements. This facilitates real-time feedback and detailed analysis, ensuring that rehabilitation exercises are performed accurately and safely.

This study aims to evaluate current AI applications in rehabilitation, assess their benefits and limitations within rural settings, and discuss the practical steps necessary for realizing AI’s transformative potential in improving health outcomes for people with disabilities. The delivery of healthcare services in rural regions has traditionally posed considerable challenges, primarily due to insufficient medical infrastructure, limited availability of healthcare professionals, and geographical constraints.

A shortage of healthcare providers, limited healthcare facilities, and inadequate healthcare infrastructure frequently characterizes rural areas. These populations have endured substandard healthcare conditions for decades, enduring the consequences of inequitable healthcare delivery, which has contributed to an escalating disparity in healthcare access. Geographic isolation, transportation challenges, low healthcare awareness, a deficient healthcare workforce, and financial constraints compound barriers to healthcare in these regions. However, addressing the healthcare gap in rural settings, coupled with educating healthcare professionals on the applications of AI, holds significant promise for the successful integration of advanced technologies into rural healthcare systems [3]. Several pivotal technological advancements underpin the implementation of AI in telemedicine. Firstly, AI-driven diagnostic systems can process vast amounts of clinical and patient data, detect intricate patterns, and forecast outcomes with accuracy that surpasses conventional methodologies.

Secondly, the use of wearable devices and remote monitoring technologies facilitates the continuous acquisition of real-time health data, enabling dynamic assessment of patient conditions. Lastly, AI-powered virtual care platforms provide tailored recommendations and direct patients to appropriate healthcare resources, thereby enhancing care delivery and optimizing the patient experience. By mitigating the need for physical travel, expanding access to specialized medical expertise, and supporting ongoing patient monitoring, AI-integrated telemedicine has the potential to overcome the geographical and resource-related barriers that have historically hindered the provision of medical services in rural areas [4]. In addressing these issues, AI has emerged as an effective intervention. The "Stroke Recovery Predictor," created by an Indian physiotherapy researcher, uses AI to forecast stroke recovery based on hospital stay, stroke duration, and Barthel Index, supporting tailored rehabilitation. Another significant application of AI technology in patient posture assessment is Open Pose, an open-source tool for posture detection. It is an open-source library developed in C++. AI has shown the potential to improve accessibility and quality of rehabilitation through remote diagnostics, and assistive technology [5].

In medical innovation, a variety of devices are presently being developed, with a significant proportion intended for application in clinical or hospital environments owing to their intrinsic complexity. Figure *1* Provides a comprehensive overview of these pivotal technologies, systematically classified into physical and virtual applications categories, each contributing significantly to home-based rehabilitation. Analyzing these technologies enables a deeper understanding of their potential impact and efficacy in facilitating patients' rehabilitation outcomes [6].

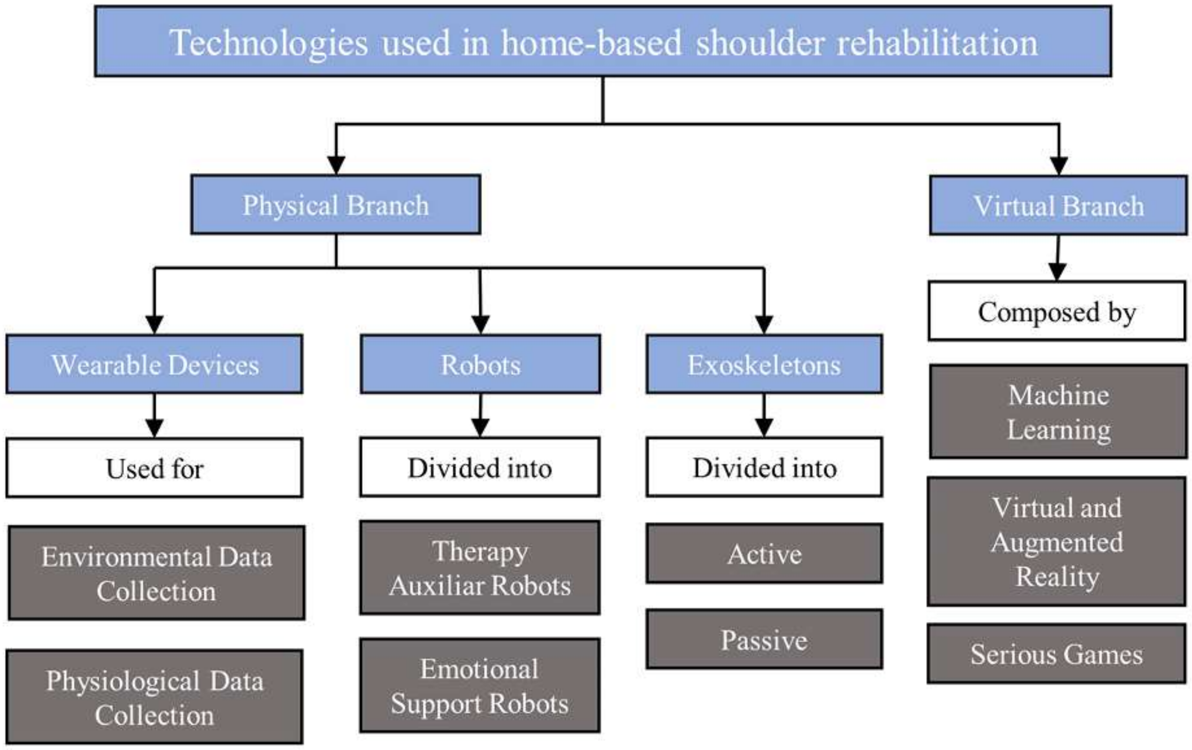


Figure 1. Technologies used for home-based shoulder rehabilitation.

The physical rehabilitation domain leverages robotic technologies to improve treatments for muscular, neuromuscular, and skeletal conditions. It focuses on mechanical devices that monitor and interact with patients, providing support throughout rehabilitation. Core components, including wearable devices, robots, and exoskeletons enhance the process through personalized interventions and real-time feedback [7]. The virtual branch of rehabilitation utilizes technologies such as machine learning, virtual and augmented reality, and serious games to transform rehabilitation practices. These tools create immersive environments for tasks like motor skill training, enable personalized interventions through data analysis, and support evidence-based decision-making. This approach enhances patient outcomes and advances clinical strategies [8]. Like any innovation, AI has dual aspects, including certain limitations. These encompass the necessity for auxiliary technological infrastructure, the absence of human touch, and a restricted capacity for patient interaction, which may hinder effective communication. Additionally, its application poses potential risks, such as therapists' and patients' undue reliance on technology [6]. This review explores the potential applications of AI in disability rehabilitation, focusing on rural and under-resourced areas.

Methodology:

Design:

The systematic review was carried out following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to guarantee transparency, consistency, and methodological integrity in presenting the review process and results. Two authors selected the relevant articles according to the following pre-established criteria. Relevant research was identified.

Search strategy:

For this systematic review, a comprehensive search strategy was implemented across multiple academic databases, including PubMed, Web of Science, Scopus, and ResearchGate. These databases were chosen to facilitate a meticulous and diverse collection of relevant literature, incorporating peer-reviewed articles, conference proceedings, and grey literature. This approach aimed to minimize publication bias and ensure the inclusion of the most relevant and current evidence. The study retrieved 50 articles with the keywords "AI," "Disability rehabilitation," and "Rural healthcare."

Eligibility criteria:

Inclusion criteria

The articles included in the study

Studies focused on AI applications in disability rehabilitation relevant to rural or low-resource settings. Full-text articles. Articles published within the last ten years. Observational studies, randomized control trials, and comparative studies. Articles that address physical rehabilitation interventions, with AI applications aimed at improving functional outcomes or quality of life. Studies that specifically utilize AI-driven technologies, such as machine learning, computer vision, natural language processing, or robotics, within rehabilitation practices.

Exclusion criteria:

Unpublished studies, in abstract form only, or lacking peer-reviewed publication and duplicate articles.

Results:

A total of 50 articles were primarily identified based on the predefined inclusion and exclusion criteria. Subsequently, 24 articles were excluded, comprising 9 articles that consisted solely of abstracts and 15 that were duplicates. Following a detailed screening of the remaining 26 articles, 11 were determined to be directly relevant to the study objectives and fulfilled all eligibility criteria. Ultimately, these 11 articles were included in the qualitative synthesis. All the critical appraisal methods were conducted by two reviewers independently. A PRISMA flow diagram detailing the systematic search is presented in Figure 2. This review includes various randomized controlled trials, interventional studies, and review articles.

Sr no.	Year	Author	Type of article	Intervention	Outcome	Results	Analysis
1.	2024	Seigo Inoue [9]	Randomized control trial	Sixty patients with first-time hemiparetic stroke were randomly assigned to one of three groups: Balance Exercise Assist Robot. (BEAR) Group: Received BEAR training in addition to standard inpatient rehabilitation. Intensive Balance Training (IBT) Group: Underwent intensive balance exercises alongside standard rehabilitation. Conventional Rehabilitation Group: Participated only in standard inpatient rehabilitation.	1. Mini-Balance Evaluation Systems Test (Mini BESTest) score 2. Timed Up and Go test	In total, 57 patients completed the intervention, and 48 were evaluated at the follow-up. Significant improvements in the Mini-BESTest score were observed in the BEAR and IBT groups compared with the Conventional rehabilitation group post-intervention and after the 2-week follow-up period ($P < 0.05$).	The findings of this study indicated that robotic balance training with the Balance Exercise Assist Robot (BEAR) significantly improved balance in hemiparetic stroke patients compared to conventional rehabilitation alone.

2.	2024	Raquel Olmos-Gómez et al. [10]	Experimental study	Twenty-three participants were divided into two groups: Experimental Group: Received standard physiotherapy sessions plus four weekly sessions of 40 minutes each with the Walkbot over five weeks. Control Group: Underwent only the scheduled physiotherapy sessions without the Walkbot.	1. Gross Motor Function Measure-88 (GMFM) dimensions D and E 2. hydraulic dynamometer 3. Range of motion	Significant improvements were observed in GMFM-88-dimension D hip flexion, hip extension (right) hip abduction knee flexion strength, and knee flexion range of motion.	Robotic-assisted gait training with Walkbot, combined with physiotherapy, demonstrated superior benefits in gait performance, muscle strength, and knee joint mobility.
3.	2018	Russell Fulmer et al. [11]	Randomized controlled trial	Participants were randomly assigned to interact with Tess, an AI-driven conversational agent, who provided tailored therapeutic conversations and support over a specified period.	1. Patient Health Questionnaire (PHQ-9) 2. Generalized Anxiety Disorder Scale (GAD-7) 3. Positive and Negative Affect Scale (PANAS)	Group 1 had daily Tess access for 2 weeks, and Group 2 had biweekly check-ins for 4 weeks. The control group received a link to the NIMH eBook. Multivariate analysis revealed a significant reduction in depression symptoms in Group 1 (PHQ-9, P = 0.03), while the control group	This study assessed the effectiveness of Tess, an AI-based intervention, in reducing depression and anxiety among college students. Participants with 2 or 4 weeks of Tess access showed significant symptom reductions compared to the control group. Results support Tess as a promising, cost-effective mental health solution for students.

						showed no change.	
4.	2021	Tomomi Anan et al [12]	Randomized controlled trial	The AI-assisted health program was fully automated. In it, the chatbot sent messages to users with exercise instructions provided at a consistent time each day through the smartphone's chatting app (LINE) for 12 weeks.	1. subjective assessment of the degree of pain on a scale of 1 to 5	The study analyzed 48 intervention and 46 control participants, with 92% adherence in the intervention group. Significant improvements in pain and stiffness were observed in the intervention group. At 12 weeks, 75% of intervention participants showed improvement compared to 7% in the control group	The study demonstrated that An AI-driven health program demonstrated a significant impact by reducing neck/shoulder pain and low back pain in workers, with 75% of the intervention group reporting improvement versus 7% in the control group. High adherence (92%) suggests the program's effectiveness in engagement and symptom management, highlighting its potential for addressing work-related musculoskeletal issues.
5.	2020	Fanni Zsarnoczky-Dulhazi et al.	comparative.	A Python-based software layer was developed over OpenPose to analyze joint angles during exercises using real-time camera input. The system computes angles through trigonometric calculations	Kinovea software	The results showed no significant difference between the knee joint angles obtained from OpenPose and Kinovea (Ave=0.33±2.29 °), as determined by a one-way t-test ($p<0.05$). This indicates that the knee angles measured with OpenPose are comparable to	This study created a video analysis tool based on OpenPose to monitor joint angles remotely, addressing the challenges of physical therapy during the COVID-19 pandemic. Validation against Kinovea revealed no significant difference in knee angle measurements (2.03±1.06°, $p<0.05$). These

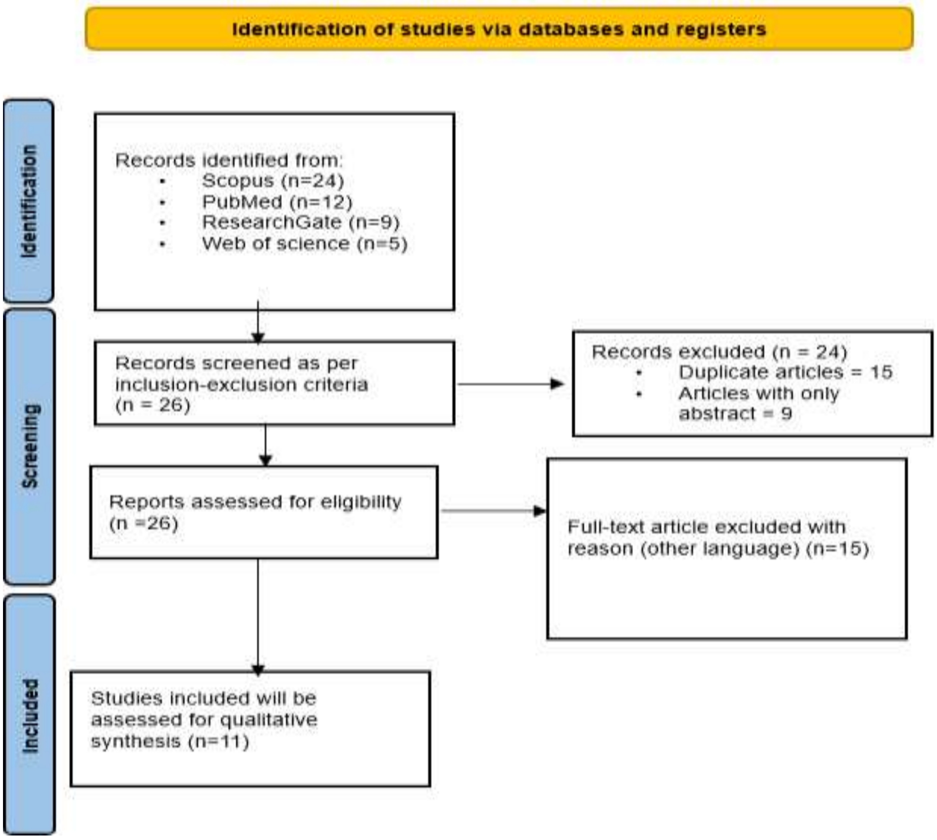
				on detected joint coordinates and uses two cameras to capture both frontal and sagittal planes, ensuring accurate and cost-effective movement analysis.		those from Kinovea. The absolute difference was 2.03±1.06°, with a percentage difference of 2.28±1.18%	results suggest that the software accurately tracks joint angles, enabling real-time, remote monitoring of exercises and potentially improving the effectiveness of physical therapy.
6.	2024	Anna Marcuzzi et al. [14]	Randomized controlled trial	The SELFBACK app is an AI-driven self-management tool offering personalized weekly plans with exercise recommendations, educational messages, and a toolbox for goal-setting, mindfulness, and pain relief.	1. SELFBACK app	Patients discussed the app's interface and content, reported usability issues, and described their usage patterns. Both patients and health care practitioners highlighted the app's primary value and its potential to supplement usual care. Participants provided insights into aspects they believed would determine the app's acceptance and offered recommendations for improvement.	Although the app's uptake was relatively low, both patients and healthcare practitioners had a positive opinion about adopting an app-based self-management intervention for lumbar and cervical pain as an add-on to usual care.
7.	2023	José-María Blasco et al. [15]	Randomized clinical trial	virtual assistant (chatbot) designed to interact with	1. Western Ontario and McMaster Universities Osteoarthritis	study aims to determine if the chatbot can enhance adherence to	

				patients undergoing total knee replacement. The control group received standard care and the experimental group received standard care in addition to the chatbot interaction.	Index (WOMAC) questionnaire 2. Timed up and go test 3. sit to stand test 4. visual analogue scale	home physiotherapy and lead to improved clinical outcomes compared to standard care alone.	
8.	2021	Sridhar Kashyap et al. [16]	experimental study	AI-based automated physiotherapy system. The system adjusts the range of motion, speed, and duration of movement exercises to suit the patient's needs. It simulates the functionality of a CPM machine while offering a more adaptive and intelligent therapy regimen.	1. gyroscopic data and a predefined questionnaire 2. A one-dimensional Convolutional Neural Network (1D-CNN)	The AI-based system achieved an accuracy of **90.21%** in determining the severity of knee ailments using a one-dimensional Convolutional Neural Network (1D-CNN).	The high accuracy of the 1D-CNN model indicates its ability to effectively classify the severity of knee conditions using minimal yet precise gyroscopic data. The proposed system significantly reduces computational costs compared to state-of-the-art models, making it feasible for widespread implementation. The adaptability and personalization features of the system highlight its potential to improve rehabilitation outcomes, particularly in resource-limited settings.
9.	2015	Wei Meng et al.	Case study	robot-assisted ankle rehabilitation	1. ROM 2. angular speed	The robot-assisted ankle rehabilitation	The patient's feedback indicated a strong preference

		[17]		training for an adult patient with cerebral palsy. ARTROMOT-SP3 robot is a motor-operated CPM device providing motion to the ankle joint.	3. stiffness level	demonstrated significant improvements in the patient's ankle ROM over 10 weeks. Dorsiflexion ROM: Increased by approximately 25%. Inversion ROM: Improved by around 50%.	for robotic therapy due to its structured and repetitive training advantages. However, limitations such as restricted ROM in plantar flexion and eversion and the absence of real-time human-robot interaction were noted. Future improvements should include adjustable robots and broader clinical trials to further validate these findings.
10.	2023	Gabriel Ng et al. [18]	Observational study	Gyroscope data were collected from a wearable sensor placed on the thigh of the prosthetic side before, during, and after the session.	1. continuous angular velocity data captured by the gyroscope. 2. models incorporating dynamic time warping (DTW) 3. Euclidean distance metrics	The study demonstrated high classification accuracy for gait changes using gyroscope data and machine learning models. Pre-training accuracy was 98.65% (Euclidean) and 98.98% (DTW), while post-training accuracy was 95.45% and 94.18%, respectively, for participants with significant gait changes.	The findings highlight the potential of single-sensor systems combined with machine learning to effectively monitor and classify gait changes in amputees, supporting their use for personalized and adaptable gait analysis in clinical and real-world settings.
11.	2022	Colin Arrowsmith et al. [19]	Observational study	convolutional neural network	Healthy subjects were recorded performing low-back and shoulder	The CNN model achieved high classification performance, with an accuracy of 99.5% ± 0.9	The study highlights the feasibility of using smartphone cameras and machine learning

					physiotherapy exercises using a mobile phone camera. Joint locations were obtained from these videos using an open-source pose detection framework. A CNN was then trained to classify the exercises based on the time-series data of these key points.	for low-back exercises and 96.3% ± 2.0 for shoulder exercises when using 12 pose estimation landmarks from both the upper and lower body.	for low-cost, scalable physiotherapy exercise monitoring. This approach can enhance patient adherence tracking and provide objective participation measures, especially in remote healthcare settings.

Figure 2: PRISMA flowchart



The results summed up in Table 1 Summary of the articles included in the review, present the following study characteristics: type of article, intervention, outcome, results, and analysis.

Table 1 Summary of the articles included in the review

DISCUSSION:

AI technologies, such as telerehabilitation platforms and virtual assistants, have made it possible to extend rehabilitation services to remote areas. AI-powered devices can monitor patient progress in real time and provide adaptive feedback, enabling continuity of care without direct physical supervision. Such solutions hold promise for ensuring that individuals with mobility limitations or other disabilities receive consistent and effective rehabilitation services. In their study, Tomomi Anan et al. introduced an AI-assisted interactive health promotion system that delivered exercise instructions via a mobile messaging app (LINE). This aligns with modern trends of integrating health interventions into familiar and accessible platforms. The intervention focused on daily reminders and fully automated interactions, which likely enhanced adherence and minimized barriers to engagement. AI-assisted programs can be easily scaled to reach a larger population, especially in workplaces with common musculoskeletal symptoms. The interactive nature of AI systems allows for tailored exercise regimens, potentially enhancing outcomes. The findings of this study provide strong evidence that AI-assisted health programs can effectively alleviate musculoskeletal symptoms in workers, making it a valuable tool in occupational health management [12]. Federico D'Antoni et al. highlight the increasing role of AI and computer vision in addressing chronic low back pain (LBP), a global health issue and leading cause of disability. Computer vision can detect subtle abnormalities in lumbar imaging that may be missed during manual review, facilitating early and accurate diagnoses. AI-driven insights can optimize treatment strategies by providing detailed structural analysis, ensuring targeted and personalized approaches. This review underscores the transformative potential of AI and computer vision in diagnosing and treating chronic LBP [20].

Vivek H Ramanandi highlights the transformative role of AI in clinical practice, specifically focusing on physiotherapy and its evolving educational needs. AI-based predictive models, like the "Stroke Recovery Predictor," showcase the potential to forecast patient outcomes (e.g., stroke recovery) using data points such as the Barthel Index and hospital stay duration. Tools like OpenPose offer cost-effective and efficient methods for posture detection and biomechanical analysis. AI-powered chatbots can guide patients through rehabilitation by offering cognitive and emotional support, thereby improving treatment adherence. Smart devices and AI applications can streamline diagnostics, enhance treatment precision, and reduce the time and cost of care [21]. Carl Froilan D. Leochico highlights barriers at the individual, organizational, and technical levels, drawing insights. The findings reveal skepticism, lack of technical knowledge, data privacy concerns, and inadequate awareness as prominent individual-level challenges. Organizational barriers include the absence of e-health policies, governance issues, and insufficient training for providers. On the technical front, limited internet coverage, software inadequacies, and infrastructure challenges remain critical hurdles. Focusing on these issues requires combined efforts, including policy reforms, investment in digital infrastructure, provider training, and patient engagement initiatives [22].

Alberto Velasquez Garcia et al. highlight the application of AI in diagnosing and managing rotator cuff tears (RCTs). AI improves imaging precision, facilitates personalized treatment planning by predicting tear reparability, and enhances rehabilitation outcomes through exercise monitoring. Despite its potential, challenges such as data quality and the incorporation of clinical parameters persist. Advancing AI algorithms and broadening their implementation in surgical decision-making and postoperative care are essential for future developments [23]. According to a study by Zeng et al., wearable technologies such as smart exoskeletons and motion sensors enable real-time tracking of patient movements, gait, and strength, which can be used to adapt rehabilitation programs. This approach ensures that patients in rural settings, who may have limited access to direct physiotherapy interventions, can still receive objective data to guide their rehabilitation [24].

Ana María Chavez-Cano examines the integration of AI into telemedicine, emphasizing its potential to enhance healthcare access in rural regions. AI enables remote diagnostics, personalized treatment plans, and automation of administrative tasks, allowing healthcare professionals to focus on patient care. However, challenges such as data privacy, digital infrastructure, and clinician oversight must be addressed for effective implementation. Training healthcare providers and ensuring AI inclusivity are crucial. While AI-driven telemedicine has transformative potential, a balanced approach is necessary to navigate its limitations and maximize benefits [34]. According to a study by Wang et al., wearable devices equipped with AI can track the range of motion, muscle strength, and gait abnormalities in individuals with musculoskeletal conditions, providing clinicians with valuable insights to optimize rehabilitation programs [35]. Nicholas Aderinto et al. highlights the potential of Virtual Reality-Based Rehabilitation (VRBR) in stroke recovery, offering an engaging and immersive environment that supports functional independence by simulating real-world scenarios. However, challenges such as high costs, equipment requirements, patient suitability, and data privacy concerns hinder its widespread adoption [37]. The digital rehabilitation sector integrates advanced technologies, including machine learning, virtual reality, augmented reality, and serious gaming, to enhance and modernize rehabilitation practices. Natural Language Processing (NLP) is a specialized branch of artificial intelligence (AI) focused on enabling machines to comprehend, interpret, and generate human language. In contrast, Machine Learning (ML) is a subfield of AI dedicated to developing systems capable of self-improvement and adaptation without explicit programming. A key component of ML is deep learning, which employs deep neural networks to identify complex patterns with minimal human intervention [37]. In physiotherapy, NLP plays a pivotal role by utilizing electronic medical records to assess patient outcomes while significantly reducing the time and effort required from healthcare professionals. NLP and ML are interrelated technologies that enhance physiotherapy by facilitating remote patient care and personalized treatment strategies [37]. Augmented Reality (AR) involves the creation of new visual elements by integrating digital information into a person's real-world environment, thereby blending artificial and physical components to simulate an interactive and immersive experience. In physiotherapy, augmented reality (AR) has been primarily developed for motor and cognitive rehabilitation, representing an innovative approach to therapeutic intervention. It serves as both a functional tool and a complementary aid to physiotherapeutic treatment by creating controlled and safe environments that closely resemble the patient's real-world surroundings [37]. Virtual Reality (VR) is an emerging technology in healthcare, defined as an interactive, three-dimensional, computer-generated program within a multimedia environment. VR can be classified into immersive and non-immersive formats, with immersive VR typically providing a stronger sense of presence within the virtual environment (VE). In immersive VR, users engage with the VE through specialized equipment, such as a head-mounted display (HMD). In contrast, non-immersive VR delivers the VE via a computer or television screen, with user interaction facilitated through a joystick or other input devices.

Beyond enhancing patient motivation, VR has been proposed as a therapeutic tool for chronic pain management through mechanisms such as distraction, graded exposure therapy, relaxation, and neurophysiological modulation. Research has demonstrated its effectiveness in treating various chronic pain conditions, including fibromyalgia, complex regional pain syndrome, and chronic low back pain [36].

CLINICAL IMPLICATION:

The integration of wearable devices like PowerBead which is designed to support recovery in stroke survivors by aiding in the restoration of arm and hand movements, Ekso Bionics, EksoNR is an exoskeleton designed to assist individuals with lower limb impairments, including those recovering from stroke, in regaining mobility [37]. Distance-based guidance is defined as the delivery of healthcare services through remote telecommunications, encompassing both interactive consultations and diagnostic assessments. Among its various applications, telerehabilitation has emerged as a prominent field over the past decade [Error! Reference source not found.]. Telerehabilitation, web-based programs, Kemtai: An AI-driven platform offering remote physical therapy, Kemtai provides personalized exercise programs to patients, enhancing accessibility to rehabilitation services [Error! Reference source not found.]. mHealth applications, virtual reality, MyMove: This VR system helps alleviate phantom pain in amputees by creating immersive environments that promote recovery through interactive scenarios. Reality DTx: Developed by Stroll, Reality DTx is an augmented reality software that projects virtual lines on the ground to guide patients with Parkinson's disease, improving their mobility [Error! Reference source not found.]. Digital interventions in clinical practice offer a multifaceted approach to rehabilitation. In the physiotherapy treatment area, Dextrous or soft robot hands have been used to provide simple mobilization in patients with musculoskeletal dysfunction [Error! Reference source not found.]. These interventions improve functional recovery, mental health, and self-management, making healthcare more efficient, patient-centered, and accessible [37]

FUTURE SCOPE:

As AI progresses, its potential applications in disability rehabilitation are anticipated to broaden. Innovative technologies, including augmented reality (AR) and robotics, can enhance conventional rehabilitation methods by providing immersive and interactive therapeutic interventions. Moreover, the integration of AI with community-based rehabilitation initiatives could promote a comprehensive approach to care, addressing not only the physical aspects of disability but also its social and psychological dimensions.

LIMITATIONS:

Despite its promising potential, integrating AI into rural disability rehabilitation faces several challenges. Infrastructure limitations, such as inconsistent internet access and inadequate availability of digital devices, present considerable obstacles. Moreover, the lack of digital literacy among both patients and healthcare providers in rural areas Could impede the efficient adoption of AI-driven interventions. Overcoming these challenges will require collaborative efforts from government bodies, non-governmental organizations, and private-sector partners to invest in infrastructure improvement and capacity-building programs.

CONCLUSION:

AI holds substantial potential for transforming disability rehabilitation in rural areas by enhancing care accessibility and personalization. Addressing ethical concerns, and workforce training will be critical to fully realizing AI's potential in these settings. AI-based applications are vital for rural rehabilitation. Artificial Intelligence (AI) holds significant potential in transforming disability rehabilitation, especially for rural populations with restricted access to specialized healthcare services. By integrating AI-driven technologies such as machine learning algorithms, wearable sensors, telerehabilitation platforms, and assistive robotics, healthcare providers can personalize treatment and long-term functional recovery. These innovations improve patient outcomes and optimize resource utilization, addressing the disparities in rehabilitation services between urban and rural regions. Future advancements should focus on refining AI algorithms for more accurate assessments, expanding telerehabilitation networks, and integrating AI with community-based rehabilitation strategies.

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