

Research Article

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Assistive Technology and Its Impact on Activities of Daily Living and Quality of Life: A Survey of Occupational Therapists in Saudi Arabia Working with Cerebral Palsy Patients

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ABSTRACT

Background: Cerebral palsy (CP) is a prevalent motor disability, characterized by permanent disorders affecting movement and posture development, resulting in activity limitations. The prevalence of CP is higher in low- and middle-income countries compared to high-income countries.

Purpose or Objectives: The research aims to explore the impact of assistive technology (AT) on improving the quality of life for individuals with CP, focusing on their ability to perform Activities of Daily Living.

Methods: The study employs a descriptive design and surveys registered occupational therapists in Saudi Arabia. The survey includes questions about the types of AT used, their perceived impact on the patients' daily lives and quality of life, and any challenges or barriers encountered in their use.

Results: The majority of therapists (92.7%) are engaged in the treatment of patients diagnosed with CP, with 71.1% utilizing AT in their treatment approach. The most commonly used types of AT are for self-care (85.2%), mobility (74.1%), and cognition (48.1%). The perceived impact of AT results in a medium to high level of improvement in the patient's ability to manage daily activities and overall quality of life. However, common barriers encountered by therapists include a lack of availability (70.4%) and insufficient financial support (70.4%).

Conclusion: The study concludes that AT plays a crucial role in improving the quality of life for individuals with CP. However, there is a need to address the prevalent barriers to its use, such as availability and financial support.

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Background

Cerebral palsy (CP) is a common cause of motor disability in individuals. CP is characterized by a group of permanent disorders that affect the development of movement and posture, resulting in activity limitations. These non-progressive disorders occur in the fetus or infant's developing brain and can significantly affect daily life activities [1]. CP prevalence currently in high-income countries stands at 1.6 per 1000 live births. However, in low- and middle-income countries, the birth prevalence rate is significantly higher [2]. Compared to their peers from the general population, individuals with CP participate less frequently in some areas of daily life [3]. Also, it is shown that CP life expectancy increased and fluctuated from childhood to early adulthood [4].

The optimal goal of occupational therapy interventions with CP individuals is to improve their ability to perform activities of daily living, cope with their limitations, and improve their quality of life [5, 6]. These interventional approaches include sensory integration, skills training for daily activities, parental counseling, assistive devices, and the provision of splints [7, 8]. Studies indicate that the elements that contribute to enhancing the quality of life are maintaining independence, autonomy, adaptability, social participation, social role functioning, and others [9]. The concept of quality of life encompasses three dimensions, including physical and mental health, emotional well-being, and social functioning, which occupational therapists focus on in a variety of ways, one of which is Activities of Daily Living [10, 11]. Activities of Daily Living are fundamental skills required to independently care for oneself, such as personal hygiene, getting dressed, eating, mobility, communication, and individuals with

CP may have difficulty performing their Activities of Daily Living [5]. Therefore, occupational therapists have a variety of approaches available to improve the quality of life for individuals with CP [12]. To improve the quality of life for individuals with CP, many researchers focus on the positive impact of assistive technology on increasing individuals' independence [13]. Assistive technology has been defined as any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to maintain or improve the functional capabilities of individuals with disabilities [14]. It is suggested that implementing early interventions, physical exercise, and assistive devices could potentially prevent functional declines. For assistive devices, a functional assessment is crucial to defining which assistive devices can help and promote the individual's functional abilities [15]. Research emphasizes the importance of assistive technology in treating individuals with CP and supporting their family caregivers [16]. Assistive technology is used to enhance the functional abilities of individuals with CP. It ensures that people can perform occupation tasks that were once inaccessible by modifying methods and enhancing skills. Consequently, by utilizing an assistive technology tool, an individual with CP can successfully cope with their external world [17]. There is currently a lack of knowledge regarding the many features of assistive technology utilized by families and individuals with CP. Furthermore, it is unclear how variables other than individual gross motor skills affect the frequency of assistive technology usage [18].

Methodology

Research Design

The study employed a descriptive design, which is chosen for its ability to provide a detailed and accurate account of a particular phenomenon or event, in this case, the use of assistive technology with cerebral palsy patients. This design allows for a comprehensive understanding of the perspectives of occupational therapists.

Participants

The participants of this study are registered occupational therapists in Saudi Arabia. As of 2022, there were 844 registered occupational therapists in the country. A combination of convenience and snowball sampling techniques was used to select the participants. Convenience sampling was chosen for its practicality and ease of access to participants, while snowball sampling helped reach a wider network of potential participants through referrals from initial participants. The sample size is calculated to be 265, based on the number of registered occupational therapists in Saudi Arabia in 2022, with a 95% confidence interval and a 5% margin of error.

Materials

The study considered all types of assistive technology used with cerebral palsy patients. A survey has been developed and validated with 6 experts to gather the necessary information from the occupational therapists. The survey includes questions about the types of assistive technology used, their perceived impact on the patients' daily lives and quality of life, and any challenges or barriers encountered in their use.

Procedure

The validated survey was disseminated via social media platforms commonly used by occupational therapists in Saudi Arabia and personally handed to the therapists in various healthcare settings. In addition, snowball sampling is used, where initial participants are asked to recommend other potential participants. This method

helps reach a wider network of occupational therapists who may not be directly accessible to the researchers.

Data Analysis

The data collected from the survey was analyzed using the Statistical Package for Social Science (SPSS) [19]. Measures of central tendency, including the median, mean, and range, were calculated to provide a summary of the data. This statistical analysis helps identify typical responses and general trends among occupational therapists. Furthermore, by calculating the range, the researchers understand the variation in responses and the diversity of opinions within the occupational therapy community in Saudi Arabia.

The findings provide valuable information on different perspectives and contribute to the field of occupational therapy. These findings are crucial for guiding future research and developing effective strategies for implementing assistive technology in the treatment of cerebral palsy.

Results

Demographic

The study examined the perspective of Occupational Therapists (OTs) with different years of experience and expertise in various settings in Saudi Arabia. There were 41 responses, (61%) were female and (39%) were male. In addition, 33 respondents work in a hospital setting and 4 work in academia and research. The largest portion of respondents (41.5%) have more than 5 years of experience as OT, followed by those with 3-5 years of experience (29.3%).

In the field of occupational therapy, a significant majority of therapists, constituting (92.7%) or 38 therapists, are engaged in the treatment of patients diagnosed with CP. Conversely, a minority of (7.3%), equivalent to 3 therapists, who do not work with CP patients, have proposed three principal recommendations for their colleagues who do. Among the therapists working with CP patients, 71.1% (27 therapists) utilize Assistive Technology in their treatment approach. These therapists employ a variety of AT types, with the highest usage observed in self-care (85.2%), mobility (74.1%), and cognition (48.1%) (Figure 1). Furthermore, (81.5%) of these therapists conduct follow-up sessions after providing AT to the patient. Approximately (85.2%) of them employ FIM/WeeFIM to evaluate the impact of AT on the patients' activities of daily living and quality of life [20, 21].

In terms of the perceived impact of AT, a plurality of therapists (40.7%) estimate that it results in a medium level of improvement in the patient's ability to manage daily activities and overall quality of life, while (33.3%) believe it results in a high level of improvement (Figure 2). Patient satisfaction with the AT is rated as high by (66.7%) of therapists and very high by (18.5%). The most prevalent barriers encountered by therapists are a lack of availability (70.4%) and insufficient financial support (70.4%) (Figure 3).

The remaining (28.9%) of therapists, equivalent to 11 therapists, who do not use AT, provide alternative interventions to their CP patients. These interventions include Play-Based Therapy (100%), Environmental Modifications (90.9%), and Neurodevelopmental Treatment (NDT) (63.6%) (Figure 4). However, these (11) therapists also face common barriers when recommending or providing AT, such as a lack of availability (90.9%) and insufficient financial support (72.7%) (Figure 5).

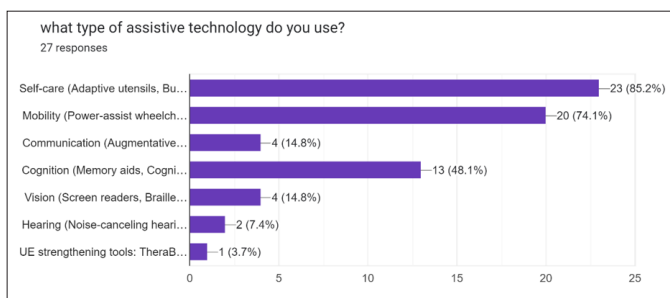


Figure 1: Types of Assistive Technology Therapists use with CP Patients

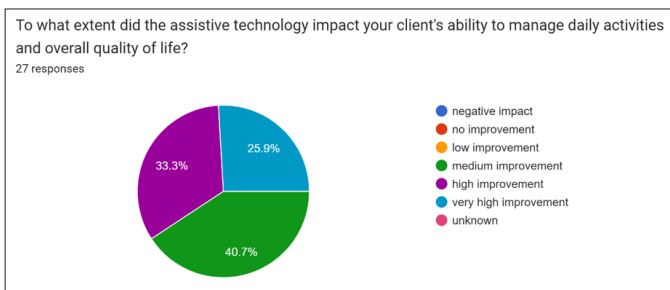


Figure 2: The Impact of Assistive Technology on CP Patients' Quality of Life

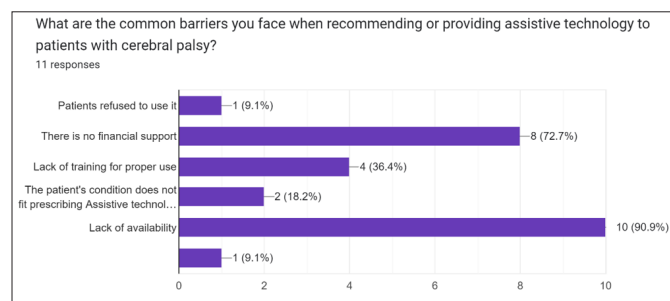


Figure 3: The Barriers the Therapists Face When Providing Assistive Technology

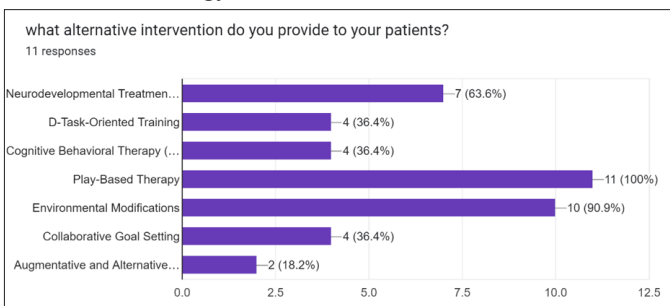


Figure 4: Alternative Interventions the Therapists Use to Accommodate Assistive Technology

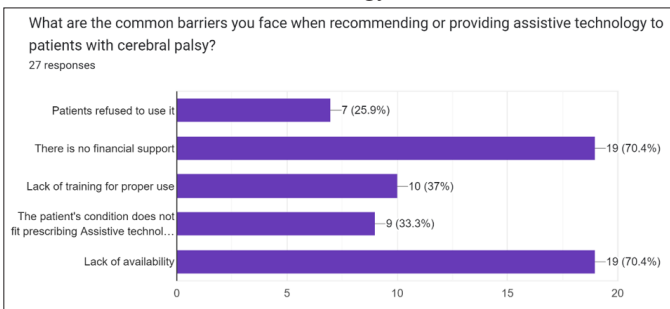


Figure 5: The Barriers that Prevented the Therapists from Providing Assistive Technology

Discussion

The results obtained from this survey can be considered a general picture of the use of AT by OTs in Saudi Arabia for CP patients. Demographic data shows that the respondents are diverse and the majority of them have more than five years of experience, ensuring that the findings are grounded in practical insights.

The high percentage of OTs working with CP patients indicates the acknowledged demand for specialized practice in this field. However, the finding that only 71% of these OTs use AT with their CP patients highlights a significant gap in the application of these technologies. Similar trends are observed worldwide. For example, Nicolson et al. noted financial constraints and inadequate AT availability as common barriers in low- and middle-income countries, while Moen and Østensjø found that even in high-income countries like Norway, parental awareness and therapist training influence AT adoption rates. This suggests that while economic factors are critical, addressing knowledge and training gaps is equally important.

The types of AT most commonly used in Saudi Arabia, self-care (85.2%), mobility (74.1%), and cognition (48.1%), align with findings from studies in Australia, where McDonald et al. reported similar focus areas. These types address core deficits in patients with CP, such as independence in ADLs and mobility. However, Saudi therapists' reliance on FIM/WeeFIM as the primary outcome measure can limit a more nuanced understanding of the impact of AT. Internationally, tools such as the Canadian Occupational Performance Measure (COPM) or Goal Attainment Scaling (GAS) have been used to provide more personalized evaluations [20]. Adopting such tools could improve the precision of outcome measurement in Saudi Arabia.

Barriers such as lack of availability (70.4%) and insufficient financial support (70.4%) are consistent with global challenges. In India, Gupta et al. similarly identified limited AT access due to fragmented healthcare care policies, while Sweden's universal AT access policies provide a successful contrast, demonstrating the potential of robust government support in overcoming these challenges [21]. Saudi Arabia could benefit from similar initiatives, such as national funding programs and local production of AT devices to reduce costs.

Therapists who did not use AT reported alternative interventions such as play-based therapy (100%), Environmental Modifications (90.9%), and neurodevelopmental treatment (63.6%). This versatility reflects a commitment to patient care despite systemic challenges. However, these therapists also cited barriers such as unavailability (90.9%) and insufficient funding (72.7%), highlighting systemic issues that affect all therapeutic approaches.

Patient satisfaction with AT was rated high or very high by most therapists, echoing findings from Scherer et al. who reported improved quality of life and independence among AT users in the US. However, the medium-to-high impact reported by Saudi therapists (74%) aligns with studies from Australia and Norway, suggesting a universal potential for AT to improve ADL and QoL when adequately implemented.

To bridge these gaps, Saudi Arabia could draw inspiration from countries such as Sweden and Australia, which have successfully integrated TA into national healthcare systems. Evidence from international studies underscores the importance of therapist training, public awareness, and government-backed financial support. For example, Scherer et al. demonstrated that targeted

workshops for therapists increased the accuracy of AT prescription by 25%, highlighting the value of professional development initiatives.

In conclusion, while Saudi Arabia's use of AT aligns with global trends in terms of its potential impact on patient outcomes, significant barriers persist. Addressing these through systematic policy changes, training programs, and innovative funding strategies could unlock the full potential of AT in transforming the lives of CP patients.

Ethical Considerations

In this study, ethical considerations were addressed. Firstly, prior to their participation, all Occupational Therapists involved were required to provide informed consent, ensuring they were fully apprised of the study's objectives and procedures. Secondly, throughout the study, we ensured that Occupational Therapists had the freedom to make informed decisions about their involvement, and we made it clear that they could withdraw from the study at any time without facing any consequences. Lastly, measures were taken to ensure the confidentiality of participating Occupational Therapists' data throughout the study. Data de-identification and restricted access were utilized to protect privacy. Only those participants who explicitly granted permission to access the study results were asked to share their email addresses.

Limitations

In this study, we encountered some limitations that may have impacted the generalizability of our findings. Despite our efforts to distribute the survey to 844 occupational therapists, we only received 41 responses. This may be because at the same time we were distributing our survey, many other graduated students were also distributing their surveys. This may be the reason that led to the low number of responses. Additionally, one of our limitations was the lack of budget, which prevented us from allocating resources to incentivize participants. Specifically, we were unable to provide gifts or coupons as encouragement for individuals to complete the survey. Consequently, this budget constraint likely contributed to the lower response rate we experienced. Furthermore, the time available for comprehensive data collection and analysis was limited. Therefore, further research with a higher response rate is necessary to validate our findings.

Recommendations

Future research should focus on identifying the most effective types of assistive technology for different subgroups of individuals with cerebral palsy, considering factors such as age, severity of disability, and individual preferences. Long-term effects of using assistive technology, including impacts on physical health, mental health, and social integration, should also be investigated. More in-depth research into the barriers to accessing assistive technology, particularly in low- and middle-income countries, is needed. In terms of clinical practice, occupational therapists and other healthcare professionals should be encouraged to incorporate assistive technology into their treatment plans. They should also receive training and resources to effectively use and recommend appropriate assistive technologies. Healthcare providers and policymakers should collaborate to address the identified barriers to accessing assistive technology, such as availability and financial support. This could involve advocating for policy changes, developing funding programs, or creating partnerships with assistive technology manufacturers.

Conclusion

This research provides valuable insights into the use of assistive

technology (AT) in the treatment of individuals with cerebral palsy (CP) by occupational therapists in Saudi Arabia. The most significant finding is that AT has a medium to high impact on improving the ability of individuals with CP to manage daily activities and their overall quality of life. However, the study also highlights the underutilization of AT, with only 71.1% of therapists using AT in their treatment approach. This underutilization is largely due to barriers such as a lack of availability and insufficient financial support. The study underscores the transformative potential of AT in enhancing the functional capabilities of individuals with CP and calls for concerted efforts to address the barriers to AT access and utilization. The findings have significant implications for clinical practice, suggesting the need for training and resources for healthcare professionals to effectively use and recommend appropriate AT, and for policy changes to improve AT availability and affordability. Ultimately, the research emphasizes the crucial role of AT in improving the quality of life for individuals with CP and the need for systemic changes to ensure all CP patients can benefit from these life-changing technologies.

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