Effectiveness of Aquatic Therapy in Autism Spectrum Disorders

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Abstract

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterised by repetitive or restricted behaviours and social communication deficits. The reported cases are on the rise. In recent years, sensory-based physical activity programmes have been incorporated into therapeutic practices for children with ASD. Among these, aquatic therapy is a multimodal intervention integrating sensory, social and motor components in a structured environment. To reduce the physical burden of movement, these water-based interventions utilize properties like buoyancy, resistance and hydrostatic pressure. Recent literature suggests that aquatic therapy can be an effective adjunct in the management of ASD, especially in enhancing social participation and motor skills. However, therapists' training and standardization in protocols need further exploration. This mini review discusses the various kinds of aquatic therapy and explores the evidence for the integration of aquatic therapy in clinical and educational settings for children and adolescents with ASD.

Keywords: Autism Spectrum Disorder, Aquatic Therapy, Motor Skills, Multimodal Treatment, Neurodevelopmental Disorders, Social Behavior.

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Introduction to ASD and Therapeutic Challenges

Autism Spectrum Disorder (ASD) is a global health issue , with a reported prevalence of 1.7% in Australia, 1% in the United States and Africa, 0.5% in Europe, and 0.4% in Asia.1 In view of significant prevalence, advanced technology and techniques are being implemented to improve motor, social, and executive skills.[1]

Since the earliest recorded history, water has been used as a means of managing acute and chronic musculoskeletal and neuromuscular disorders.[2] The treatments have since evolved and are now used in modern ways. Aquatic therapy uses tools like harnesses, balance equipment, leg weights, pool noodles, flotation devices, resistance gloves, underwater treadmills, and guided manual techniques.

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The aquatic sessions can be done as one-on-one, in groups, or involve a simple recreational swimming lesson.[3]

Theoretical Basis of Aquatic Therapy

Conventional land-based therapies for ASD patients involve greater sensory load, coordination difficulties, and communication challenges. Sensory hypersensitivity occurs in response to bright lights, noise, and unfamiliar equipment or routines.[4] These factors reduce the effectiveness of land-based therapies and suggest the need for a more adaptive and multisensory approach like aquatic therapy.

Water, on the other hand, offers a playful and relaxing environment for increasing physical performance and social interaction.[5]

Aquatic therapy helps in improving physical activities, social communication, and behaviour patterns in ASD patients. It is particularly beneficial for ASD patients who require strong sensory stimulation. Contact with water induces a calming effect, which increases the chances of social interaction with others (Figure).[6]

Adaptive behaviours, emotional regulation, executive functioning and gross motor coordination have been enhanced using programmes like the Halliwick concept.

Halliwick concept in aquatic therapy is useful specifically for improving social interaction and behavioural patterns.[6] Aquatic therapy with peers and siblings significantly improves interaction behaviours and aquatic skills.[7,8]

Figure: Aquatic therapy improving social communication in ASD children

Link to picture: https://ymcafw.org/wp-content/uploads/2023/12/Sw_ Swimming5.jpg (Creative Commons-Free to use)

For physical activities, aquatic therapy utilizes water's unique properties like buoyancy, viscosity, water temperature, and hydrostatic pressure that reduces gravitational forces and facilitates movement. Buoyancy reduces weight-bearing and viscosity, and hydrostatic pressure provide multi-directional resistance, helping patients with ASD to improve physical competence in performing activities of daily living as well as swimming skills.[6]

Halliwick Concept-Based Aquatic Therapy

The Halliwick Concept is a holistic and structured method of aquatic therapy that places a strong emphasis on movement control in the water without the use of flotation devices. It is especially appropriate for kids with neurodevelopmental disorders like ASD since it emphasizes balance, breath control, mental adjustment, and trunk rotation. This 10-point programme gradually enhances mobility and postural control in a repeatable framework and encourages independence in the water and supports motor learning.[9]

Halliwick approach significantly improves balance, behaviour, and motor coordination. Protocols typically involve 8- 16 weeks of training with 2-3 sessions per week, ranging from 60- 90 minutes per session.[9,10]

This approach is effective for children with ASD; however, it requires trained therapists and may be difficult to implement in low resourced settings.

Watsu Aquatic Therapy Method:

Watsu is a passive, one-on-one aquatic therapy method that uses warm water to induce relaxation, joint mobilization, and massage. To stimulate the parasympathetic nervous system and encourage relaxation and sensory integration, it employs soft, rhythmic cradling, stretching, and pressure techniques.

It is less researched in ASD than Halliwick, however the advantages like lowering anxiety, behavioural dysregulation, and sensory defensiveness are supported by case-based evidence. A 5-day intense Watsu treatment improved an adult with ASD's emotional regulation, reduced stereotypical behaviours, and increased resilience.[11] Tactile contact and a sensory-rich environment seem to promote behavioural and emotional self-regulation. Watsu, is less strenuous than other water modalities and emphasizes sensory modulation over strength or coordination. It requires a high level of therapist participation and due to the highly personalized nature of Watsu, clinical outcomes may vary significantly between individuals.

Mixed Aquatic Therapy Approach

Interventions that incorporate aspects of several aquatic approaches, such as Halliwick, swim training, sensory integration exercises, and free-play or game-based activities, are referred to as mixed aquatic therapy. These protocols, which are frequently modified to meet the sensory-motor demands of kids with ASD, use dynamic and engaging water-based activities to improve social interaction, physical competence, and adaptive behaviour. A 10-week intervention using mixed methods i.e., combining Halliwick principles with aquatic games and task-specific activities, can show significant improvements in physical competence, social responsiveness, and water safety behaviors in children with ASD.6 Both structured and play-based aquatic protocols improve gross motor abilities and decrease stereotyped behaviors.[12]

Mixed aquatic therapies are usually conducted in two to three weekly sessions for 45 to 60 minutes over a period of 8 to 12 weeks. They allow therapists the freedom to modify tasks according to the child's motivational preferences and sensory profile. However, standardization continues to be a major research and practice limitation because of implementation variability.

Comparative Advantages

Aquatic therapy provides a more supportive and engaging environment for children with ASD as compared to traditional land-based therapy. Land-based therapy is physically more demanding and stimulating, whereas aquatic therapy reduces body stress and offers a calming sensory input. Children often resist land therapy due to rigid routines, but water activities are playful and motivating. As for behaviour, social interaction, emotional regulation, and motor skill improvement have shown greater gains in aquatic settings.[13]

ASD patients report these positive behaviour patterns only when they have engaged for about 8-16 weeks in therapy sessions. This suggests that the benefits of aquatic therapy take time.

Implementation Challenges and Local Context

While there are various advantages of aquatic therapy for individuals with ASD, there are certain limitations as well. Lack of standardized intervention protocols makes it difficult to compare outcomes across studies. Another challenge is non-availability of qualified personnel and suitable aquatic facilities. Aquatic therapy is resource-intensive, requires specialized settings and one-on-one supervised sessions are recommended to reduce risk of injury.[14] To maximize its effectiveness, aquatic therapy programmes should be carefully designed with appropriate monitoring, and individualized goals.

In Pakistan context, awareness and implementation of specialized therapies such as aquatic therapy for children are still in early stages. Globally improvement in motor

skills, sensory integration and social behaviour using aquatic therapy has been proven but its use remains limited in Pakistan due to lack of trained staff, inadequate access to aquatic therapy and limited public awareness regarding its potential.

Aquatic therapy is frequently overlooked as a potential solution due to cost, and the preference for more conventional therapies (including occupational and speech therapy). However, recent local research has shown encouraging evidence that structured aquatic therapy programmes can significantly improve sensory modulation and activities of daily living in children with ASD.[15] This emerging local evidence highlights the feasibility and effectiveness of aquatic therapy in the Pakistani healthcare context.

Even with these positive indications, access to specialized aquatic facilities is still a major obstacle, even in major cities. With the help of capacity-building programmes and awareness campaigns, Pakistani healthcare facilities, special education schools, and rehabilitation clinics can incorporate aquatic therapy into their service offerings.

Mobile aquatic therapy units can also help deliver therapy in underserved rural areas which would reduce the reliance on permanent centers. Furthermore, public–private partnerships between the government, private hospitals, and NGOs can help establish shared aquatic therapy facilities that are accessible for all.

Government can also integrate aquatic therapy into special education curricula to allow special education schools to offer it as a regular programme. These programmes should be conducted by trained therapists who have taken specialized rehabilitation programmes; including theory and hands-on practice.

With proper support, aquatic therapy has the potential to become a valuable component of holistic care for children with ASD in Pakistan.

Conclusion

Aquatic therapy supports the overall development of patients with ASD. By combining movement, sensory input, and interaction in a single setting, physical coordination, emotional balance, and social connection grows significantly. Patients respond positively to the calming effects of water, which encourages participation and reduces resistance to therapeutic activities. Different techniques, specially the Halliwick concept, prove that structured aquatic therapy can build confidence and independence in the long run. These benefits allow patients with ASD to achieve meaningful progress in both daily functioning and quality of life.

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