



Science, Movement and Health, Vol. XVII, ISSUE 2 Supplement, 2017

September 2017, 17 (2, Supplement): 490-496

Original article

## EFFECT OF AQUATIC EXERCISES APPROACH (HALLIWICK-THERAPY) ON MOTOR SKILLS FOR CHILDREN WITH AUTISM SPECTRUM DISORDERS

SHAMS-ELDEN Mohamed<sup>1</sup>

### Abstract\*

*Aim.* During neurological rehabilitation, monitoring of all points performed less frequently, since the main objective of the therapeutic use of Halliwick concept is independent swimming, but if you improve both independence outside as in the water. The 10-point program is complemented by the specific water therapy, a system for creating individual exercises that can be adapted and increased in difficulty by carefully selecting a combination of hydro mechanical effects, initial position and task. The purpose of this study was to investigate the effect of aquatic exercises approach (Halliwick-therapy) on motor skills for children with autism spectrum disorders.

*Methods.* The study sample was selected from Al Amal Association in Mansoura state. The research sample consisted of (14) autistic children, and (4) autistic children were excluded for conducting the exploratory study.

*Results.* Statistical analyses showed that:

- Statistically significant differences between the pretests and posttests for the experimental group in 20m run, the standing broad jump test, Mushroom Float and Walking in the pool.
- No significant differences between the pretests and posttests for the experimental group in Childhood Autism Rating Scale (CARS).

*Conclusions.* Ten weeks from aquatic exercises approach (Halliwick-therapy) could affected on motor abilities for children with autism spectrum disorders. These results have to be taken into account by instructors in order to better understand and implicated of these concepts for technical effects of therapy.

*Keywords:* Halliwick-therapy, aquatic exercises, autism spectrum disorders.

### Introduction

As far as, the communities provide services and facilities to groups of people with special needs and their positive attitudes, as this shows the civilization and humanity of these communities and these services. Whether educational, medical, social, cultural or sports, the goal is to facilitate the way of life to them to the extent possible, and to assist them in obtaining their rights to live a decent and normal life within our larger society.

Abdul Salam & Yousef, (1995) noted that global attention has recently increased with the education and rehabilitation of the disabled and working to utilize their potential to be an effective and productive force in the society in which they live.

Rabia, Tariq, (2013) noted that in recent years efforts have been directed towards rehabilitating and caring for disabled children as a result of the development of human thought, equality of opportunity, equality and the rights of

children so that they can live happily with their abilities and capabilities.

According to (Simon, 2008) mental disabilities is one of the most important problems which faced the developing countries. Where the mentally handicapped are a burden on these countries and their families because they are, a non-productive consumer energy and they always need those who depend on them and care for them. Therefore, developed countries have recently been interested in directing scientific research to study the phenomenon of mental disability to identify the abilities and potential of the mentally disabled, and to provide treatment programs to develop their remaining capacities so that they can rely on themselves partially or completely in their lives rather than remain dependent on their families and Community.

Deborah (2004) noted that autism spectrum disorder (ASD) is a developmental disability that

<sup>1</sup> Faculty of Physical Education, Mansoura University, EGYPT

E-mail address: amr297@aswu.edu.eg

Received 03.03.2017 / Accepted 07.04.2017

\* the abstract was published in the 17<sup>th</sup> I.S.C. "Perspectives in Physical Education and Sport" - Ovidius University of Constanta, May 18-20, 2017, Romania



persists throughout the individual's life, affects the way he speaks and establishes a connection with those around him. It is difficult for children and adults with autism to establish clear and strong links with others. They usually have limited ability to make friends and understand how others express their feelings.

Children with autism can often have learning disabilities, but all people with the disease have difficulty understanding the meaning of life.

The Autism spectrum disorder (ASD) was classified as one of the most prevalent developmental disorders in the world (1994) by the Diagnostic Statistical Manual of Mental Disorders (DSM IV).

While (Houston-Wilson, Lieberman, 2003) suggest that there are three patterns of mental retardation that are the most common and prevalent patterns worldwide, and that such patterns are caused by proportions and rates of prevalence, with mental retardation at its beginning, followed by autism disorder, followed by Down syndrome.

(Dianne, et al., 1996) noted that children with autistic spectrum disorder (ASD) typically faced with three major types of difficulties. These difficulties known as triple disability:

- Social interaction (difficulty in social relations as if the person appears to be conservative and indifferent to others)
- Social communication (difficulty in verbal communication and non-verbal communication as not fully understanding the meaning of common gestures, facial expressions and tones).
- Fantasy (difficulty developing imagination and playing with others as if it has a limited number of fictional activities and is likely to be replicated and produced in a strict and repetitive manner).

(Dykens, Cohen, 1996) shows that sport plays an important role in the lives of autistic children, contributing significantly to improving language space, increasing social skills, free interaction in play situations with others, helping to develop self-care skills, increase the ability to observe long periods and increase the speed of reverse reaction and the ability to plan and organize.

During the last decade, hydrotherapy has been used for rehabilitation neuromuscular and skeletal muscles (Garreau, et al., 2013). It seeks to promote greater independence and functionality, enhancing appropriate movements and minimizing possible anomalous responses (Huettig, Darden-Melton, 2004). Based on the principles of

hydrodynamics (buoyancy, resistance, relative density, viscosity, turbulence, hydrostatic pressure and flow) and was thought to provide various sensory stimuli through water temperature, weight loss and vestibular afferents.

The properties of water promote active movement, relaxation of the spastic muscles, greater support, help strengthen and improve the circulation, allowing a variety of motor skills.

Hence, the importance of sports training in developing their cognitive skills and physical abilities, which is reflected in the development of mental abilities, through special programs that take into account the characteristics of this category.

Water exercises have been a major part of the great scientific development as it has become used not only in improving physical fitness or as a therapeutic exercise for sports injuries, but has become much more involved in the rehabilitation of special needs groups.

Aquatic exercises characterized by land exercises that help to lower the body load on the knees during performance. Autism spectrum disorder (ASD) no matter how much weight does not feel the weight of this weight on the knees in the water where the water acts as a cushion for the joints during the performance, which makes them integrate into the performance of extreme sports effort without this can cause pain or pressure on the joints.

(Donna, 1986) suggests that water exercise is also characterized by the additional effect of water resistance, water pressure, buoyancy and its positive effects on the individual's body.

(Wafeka, 1997) adds that swimming is part of the treatment program as an adjunct to the body. Because it floats and is carried by water. This relieves the effort exerted on the muscles as compared to the vertical standing position with the low gravity effect. It also aims to develop the ability to retain the body. Water with moving some limbs and muscles.

James McMillan developed Halliwick method in the year 1940, in which he introduced persons with disabilities to the aquatic environment (McMillan, 2006). It began in the 1950s, when James McMillan and Joan Martin wanted to develop a special swimming program for children with some kind of injury at Halliwick School in London (McMillan, 2002)

A year later, in 1951 a swimming club was founded (Halliwick Penguin Swimming Club), later in 1952 (Halliwick association of swimming therapy) and in 1962 McMillan is invited to teach his concept in the Medical Center Bad Ragaz (Switzerland) (Ballaz, et al., 2011)



They created the 10-point program to gradually achieve greater safe and dexterity in the water. Phase one of the program includes mental adjustment and detachment, while the second phase focuses on the learning of three-dimensional control through active balance using dynamic and static tasks such as rotation controlsagittal, transverse, longitudinal and a combination of them. The goal of the third phase of movement is an independent swimming technique adjusted to the physical disability individual, which encompasses the points of thrust and mental immersion, the balance in calm, sliding with turbulence, simple progression and basic movement of Halliwick. (Groleger et al., 2008)

During neurological rehabilitation, monitoring of all points performed less frequently, since the main objective of the therapeutic use of Halliwick concept is independent swimming, but if you improve both independence outside as in the water. The 10-point program is complemented by this specific water therapy, a system for creating individual exercises that can be adapted and increased in difficulty by carefully selecting a combination of hydro mechanical effects, initial position and task. (Joseph, 2004)

Based on the above, Play in the water has become a highly desirable activity for children with Autism Spectrum Disorder (ASD). The Water medium is a perfect stimulation for the psychomotor development of children, and favors the relaxation and well-being of the child. Another aspect is that the child with autism in these sporting moments is in a playful environment where you can do aquatic exercise, which mostly enchants all the little ones.

Therefore, the researcher conducted this study under the title "effect of aquatic exercises approach (Halliwick-therapy) on motor skills for children with autism spectrum disorders".

### Methods

The study sample was selected from Al Amal Association in Mansoura state. The research sample consisted of (14) autistic children, and (4) autistic children were excluded for conducting the exploratory study. The basic research sample was (10) autistic children. The experimental group practices the aquatic exercises program for ten weeks, three times weekly. The researcher conducted homogeneity in age, height, weight, degree of autism and Table (1) shows that.

### Instruments

#### Childhood Autism Rating Scale (CARS)

This standard diagnoses autism in children. This measure differs from other behavioral assessment tools in that it can determine if your child is suffering from autism or other delayed developmental disorders such as mental retardation. It makes it easy for health care providers, teachers and parents to identify and classify autistic children.

The scale measures your child's behavior, characteristics, and abilities compared to a "typical child". These characteristics are evaluated:

- Relationship with people
- Tradition
- Emotional response
- Use the body
- Use of objects
- Adapt to changes
- Visual response
- Audio response
- Response to taste, smell and touch and how to use them
- Fear and nervousness
- Verbal response
- Nonverbal response
- Activity level
- Level and consistency of intellectual response
- General impressions

This is done by the primary health care provider, the teacher or a parent by classifying the behaviors of the child from 1 to 4. 1 This means normal behavior in the age of the child, 2 the least is said to be abnormal behavior, 3 is abnormal but moderate and 4 is very natural:

1 = normal or normal behavior and appropriate with the age of the child

2 = Behavior is slightly abnormal and minor

3 = Behavior is abnormal and moderately moderate

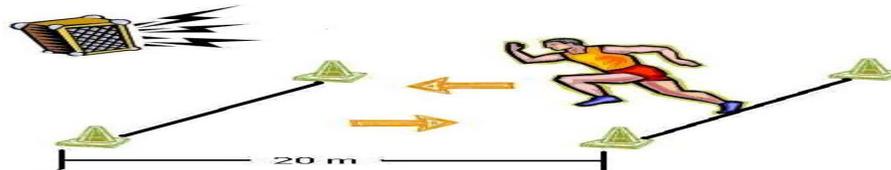
4 = Behavior is abnormal, inappropriate, and severely impaired

After answering all questions carefully, we collect all the tags. The total will range from 15 to 60 and be interpreted as follows:

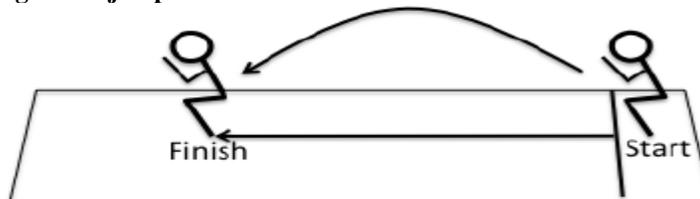
- 30 Be the beginning of a mild autism diagnosis.
- The rates between 30-37 indicate a mild to moderate state of autism
- While rates ranging from 38 to 60 indicate a severe unification

**Physical tests.**

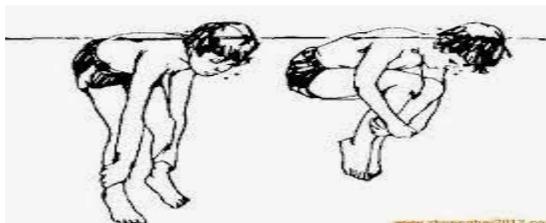
**1. 20m run**



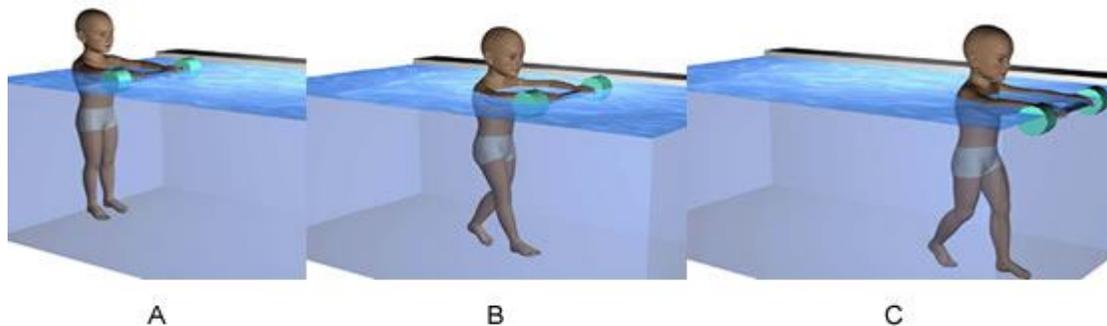
**2. The standing broad jump test**



**3. Mushroom Float**



**4. Walking in the pool**



**Statistical Data Analysis**

Differences in Childhood Autism Rating Scale (CARS), 20m run, the standing broad jump test, Mushroom Float, and Walking in the pool between the two measurements (pretests-posttests) were compared using a paired t-test. The level of significance was set at  $p < 0.05$ , and all data are reported as mean  $\pm$  SD.

**Results**

**Table 1. Shown the age, Anthropometric Characteristics and degree of Childhood Autism Rating Scale (CARS) for the experimental Group (Mean  $\pm$  SD)**

Group	N	Age [years]	Weight [kg]	Height [cm]	Childhood Autism Rating Scale (CARS)
Experimental	14	9.45 $\pm$ 1.7	26 $\pm$ 5.67	126 $\pm$ 7.65	34.56 $\pm$ 2.71

Table 1 shown the age, Anthropometric Characteristics and degree of Childhood Autism Rating Scale (CARS) of the subjects. There no significant differences were observed in the anthropometric characteristics for the subjects in the experimental Group.



**Table 2. Shown Mean  $\pm$  SD, change Rate, and “T” sign between Pretests and Posttests for experimental group in 20m run, the standing broad jump test, Mushroom Float, Walking in the pool and Childhood Autism Rating Scale (CARS).**

Variables	Pretests		Posttests		Rate %	T sign
	M	SD	M	SD		
20m run	7.84	0.46	6.58	1.32	16.07	Sign
The standing broad jump test	98.78	3.91	104.49	4.21	5.78	Sign
Mushroom Float	1.21	0.11	5.43	1.65	376.45	Sign
Walking in the pool	3.43	0.54	5.32	1.13	55.18	Sign
Childhood Autism Rating Scale (CARS)	35.24	2.67	31.31	3.19	11.15	No Sign

Significant differences,  $p < 0.05$

It is clear from Table (2) that a statistically significant differences between the pretests and posttests for the experimental group in 20m run, the standing broad jump test, Mushroom Float and Walking in the pool. No significant differences between the pretests and posttests for the experimental group in Childhood Autism Rating Scale (CARS).

### Discussing

According to the results, the researcher attributed these differences to the effect of the proposed hydrotherapy program in improving the physical variables of the sample in question.

Water training is an effective medium in which the degree of autism, physical changes, buoyancy level and the two men's feet can be improved for autistic children. Encouraging them to integrate into society and enjoy with the joys of life together with the right children, and strengthen the sense of belonging to the community and their effective role. In addition, the practice and progress of the children of autism or normal make them more active and able to absorb and think they are more self-confident and more acceptable in the society in which they live.

Joseph (2004) confirmed that exercise is an important therapeutic recreational vehicle for children of autism, which reduces the behavioral disorders of this category, for improving their motor performance.

It is consistent with (Monica Lepore et al., 2007) that show the water exercise is a medium educational, training and rehabilitation for children of autism. The weight of the body of the child autism within the water is 90% less than the normal weight of the child, resulting in the lack of pressure on the joints of the body and thus a wide range of freedom with performance freedom.

The results of the study are consistent with the study by (Leaf, McEaching, 1999; Dykens, Cohen, 1996; Pitetti, et al., 2007), that sports activity in general and water training in particular reduces the degree of autism and improves the sensory, cognitive and physical abilities of autistic children.

The results of the study agree with the study of (Azza, 2001) that the water games program has an effective impact on learning mentally disabled children some basic skills in swimming

The aquatic environment provides children with three-dimensional movements for continuity of a movement that gives more strength to the temporal-spatial knowledge, coordination kinesthetic perception and balance. On the other hand, the swimming requires a resistance and conditions cardiorespiratory diseases, so we will work to achieve efficiency in terms of the cardiopulmonary apparatus for physical activity, as well as reduction of mouth breathing. (Karen, 2013)

In this environment rich situations are shared that foster the work of interpersonal relationships, the recognition and respect of the other's time, sharing a space, sharing and learning next to another.

(Patrick, et al., 2003; Vonder Hulls, et al., 2006; Noh et al., 2008; Maria, et al., 2008) emphasizes the practice of aquatic activities as an extraordinary prophylactic source (therapeutic and corrective) of innumerable bodily affections that will also help to increase the number of people who want to enjoy.

One of the most important aspects in working with the autistic child in the aquatic environment is improvement in the most basic aspects of child development, with a strong emphasis on socialization.

The results of the study agree with the study of (Noha, 2002) in the superiority of the integrated group, which includes mentally disabled children and children on the non-integrated group to learn.



### Conclusions

Ten weeks from aquatic exercises approach (Halliwick-therapy) could be affected on motor abilities for children with autism spectrum disorders. These results have to be taken into account by instructors in order to better understand and implicate of these concepts for technical effects of therapy.

### Acknowledgements

Thank you to all of experiments subjects.

### References

- Abdul Muttalib A, 2005. The Psychology of People with Special Needs and their Education, Dar Al-Fikr Al-Arabi, Cairo.
- Abdul Salam A, Yousef M, 1995, The Psychology of the Unusual Child and Special Education, Dar Al-Nahda Al-Arabiya, Cairo.
- Azza A, 2001, Effectiveness of a proposed water games program on learning some basic swimming skills among children with mental disabilities. Master Thesis, Faculty of Physical Education for Girls, Helwan University.
- Ballaz L, Plamondon S, Lemay M, 2011, Group aquatic training improves gait efficiency in adolescents with cerebral palsy. *Disabil Rehabil*; 33(17-18):1616–24.
- Deborah R, Barnbaum, 2004, The Ethics of Autism: Among Them, but Not of Them (Bioethics and the Humanities), Indiana University Press; illustrated edition
- Dianne Z, David F, Angi S, 1996, Autism spectrum disorders: identification, education, and treatment,
- Donna de Varona's, 1986, Hydro-Aerobics Swim Your Way to Total Fitness, First Paperback Edition, New York: Fawcett Columbine
- Dykens EM, Cohen DJ, 1996, Effects of Special Olympics International on social competence in persons with mental retardation, *Journal of the American Academy of Child and Adolescent Psychiatry*, 35(2), 223-229.
- Garreau C, Barthelemy D, Sauvage I, Leddet G, LeLord A, 2013, comparison of autistic syndromes with and without associated neurological problems, *Journal of Autism and Developmental Disorders*, Volume 14, Number 1 / March,
- Grolegersršen K, Vrečar I, Korelc S, 2008, Swimming program based on Halliwick concept: evaluation of swimming skill progress in a group of children with motor disabilities. *Neurol Croat*; 57(3):4.
- Houston-Wilson C, Lieberman LJ, 2003, Strategies for teaching students with autism in physical education. *Journal of Physical Education, Recreation & Dance*, 74(6), 40-44.
- Huettig C, Darden-Melton B, 2004, Acquisition of aquatic skills by children with autism, *Palestra*. 20:20-46.
- Joseph PW, 2004, Adapted physical education and sport, human kinetics, USA.
- Karen HH, 2013, Mental Retardation, *eMedicine Journal Specialties*, Eastern Carolina School of Medicine, USA.
- Leaf R, McEaching J, 1999, A work in progress: Behavior management strategies and a curriculum for intensive behaviors treatment of autism. New York: DRL Books
- Maria F-P, Stephen MH, Margaret EO, 2008, Group aquatic aerobic exercise for children with disabilities, *Developmental Medicine & Child Neurology*, Volume 50 Issue 11, Pages 822 - 827
- Martin J, 1981, The Halliwick Method. *Physiotherapy*. 67(10): 288–291.
- Maurice C, Green G, Fox RM, 2001, Making a difference: Behavioral intervention for autism. Austin, TX :ProEd.
- McMillan J, McMillan PH, 2006, Association of swimming therapy: foundation course handbook. Lond Halliwick Assoc Swim Ther.
- McMillan P, 2002, The Halliwick Story. Lond Halliwick Assoc Swim Ther.
- Monica LG, William G, Shawn FS, 2007, Adapted aquatics programming: a professional guide, human kinetics , USA.
- Noh DK, Lim JY, Shin HI, Paik NJ, 2008, The effect of aquatic therapy on postural balance and muscle strength in stroke survivors – a randomized controlled pilot trial. *Clin Rehabil*; 22: 966–976.
- Noha YA, 2002, The effect of integration between children with mental disabilities and children with basic skills in swimming, Master, Faculty of Physical Education for Girls, Helwan University.
- Patrick D, Frank RR, David P, 2003, Rethinking disability. The emergence of new definitions, concepts and communities, Garant Uitgeversnv, USA.
- Pitetti KH, Rendoff AD, Grover T, Beets MW, 2007, The efficacy of a 9-month treadmill walking program on the exercise capacity and weight reduction for adolescents with severe



- autism, *J Autism Dev Disord.* Jul; 37(6):997-1006.
- Rabia A, Tariq A, 2013, Care for people with special needs - mentally handicapped, International Dar Publishing and Distribution, Cairo.
- Simon S, 2008, Mental Retardation, *eMedicine Journal Specialties*, Medical College of Georgia, USA.
- Vonder Hulls DS, Walker LK, Powell JM, 2006, Clinicians' perceptions of the benefits of aquatic therapy for young children with autism: a preliminary study. *Phys OccupTherPediatr*; 26(1-2):13-22.
- Wafeka M, 1997, Water Sports - Objectives - Methods of Teaching - Evaluation Methods, Knowledge Establishment, Alexandria.