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Research Article

Does swimming exercises improve posture for blind and visually impaired children?

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Abstract. Aim: The aim of this study was to investigate the effect of a 4 months swimming program on the posture in blind and visually impaired children. Material and methods: A number of 30 blind and visually impaired children aged 8-14 participated in the study. The children practiced swimming exercises twice a week, 60 minutes a session. Postural variables, such as deviation of the spine in sagittal planes, head posture, thoracic kyphosis, lumbar lordosis, were measured with the Global Postural System. Results: For the cervical curve we observed a statistically significant improvement $p<0.001$. The distance between the plumb line and the apex of the cervical lordosis decreased from a mean value of 12.850 to 9.217. For the dorsal curve we observed a statistically significant improvement $p<0.001$. The distance between the plumb line and the apex of the dorsal kyphosis decreased from a mean value of 16.677 to 13.150. For the lumbar curve we observed a statistically significant improvement $p\leq0.001$. The distance between the lumbar lordosis apex and the vertical that touches the buttock decreased from a mean value of 8.387 to 6.820. Conclusion: Swimming has positive effect in improving sagittal deviations of the spine for visually impaired and or blind children.

Key Words: swimming exercises, blind children, posture

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Introduction

Visual system is one of the sensory systems that allow the body to assess and process information about the external environment. In the absence of vision, a person loses contact with the outside world and develops faulty motor patterns, which results in postural deficiencies.

The control of human posture depends on the integration of information from various sensory modalities. The optimal interaction between the visual impulses and the somatosensory impulses guarantees the control of the orientation and the stability of the body segments. The stability and control of the position of the body segments, as well as the response to the environment, are disturbed if there is not enough visual information.

Vision plays an important role in the development of postural reflexes (Carroll 1961).

A blind child develops abnormal postural reflexes and faulty motor patterns, leading to incorrect distribution of muscular force throughout the body (Barlow 1955) which leads to postural and balance deficits (Ross 1977, Jeon & Cha 2013).

More than half of the normal sensory intake of the brain is lost for blind children, (Stambough, Dolan et al 2007), disrupting the normal mechanism of neurological integration and disintegration, and preventing the formation of good postural habits (Miller 1967, Gessell 1949).

Absence of vision leads to numerous complex sensory and motor abnormalities (Alotaibi at al 2016).

Deviation in normal movement pattern starts with retraction of head and includes increased pelvic rotation, excessive backward leaning of the trunk with dorsal kyphosis, compensating forward head posture, abnormal contralateral trunk and arm movements, and flexion contractures (Miller 1967), all of which lead to faulty body mechanics (Nakamura 1997, Ross 1977).

Muscular weakness in blind children can also cause posture problems. The absence of visual input can affect the body movements with are among the causes of postural disorders (Coughlan et al 2012; Horak, 1987; Deliceoğlu et al 2017).

Low vision affects mainly the upper body postural changes, as often as in the frontal as well as in the sagittal plane (Narvila & Kulsa 2014).

Children with visual impairment had increased head tilt, uneven shoulders, and greater lateral deviation of the spine, thoracic kyphosis, lower lumbar lordosis, and more severe valgus deformities on knees (Michelle et al 2018).

The aim of this study was to investigate the effect of a 4 months swimming program on the posture in blind and visually impaired children.

Material and methods

Study group

The study included 30 visually impaired or blind children from the Special School for Visually Impaired Children from Cluj Napoca, 14 boys and 16 girls aged between 8 and 14 years old. The study was conducted over a period of 4 months.

The children practiced swimming twice a week 60 minutes for a session, a total number of 32 sessions.

Parents and children were informed about the activities carried out in the study. Parents signed the informed consent to use the data from the study. The ethical visa was granted at the beginning of the study.

Measurements

Global Postural System

The Global Postural System is a medical device for analysis of posture, a set of devices for the acquisition of data during the patient visit, a set of photo-capture devices, a computer and software for data management.

Postural variables, such as deviation of the spine in sagittal planes, head posture, thoracic kyphosis, lumbar lordosis, were measured at the beginning and the end of the study.

We measured the distance between the vertical that touches the apex of the dorsal curve and the apex of the cervical lordosis, the distance between the plumb line and the apex of the dorsal kyphosis and the distance between the lumbar lordosis apex and Statistical analysis

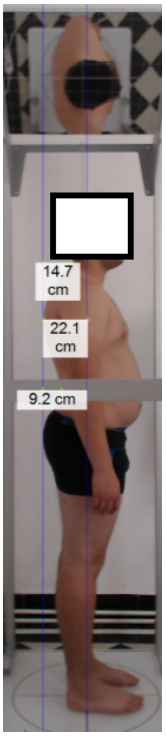

Figure 1. Global Postural System

Statistical analysis was performed using MedCalc Statistical Software version 19.1 (MedCalc Software bv, Ostend, Belgium; https://www.medcalc.org; 2019). Continuous data were tested for normality of distribution using the Shapiro-Wilk test and characterized by mean and standard deviation. Qualitative data were expressed as absolute and relative frequency. Differences between measurement were verified with the paired t test. A p value of <0.05 was considered statistically significant.

Results

For the cervical curve we observed a statistically significant improvement p<0.001. The distance between the plumb line and the apex of the cervical lordosis decreased from a mean value of 12.850 to 9.217.

Table 1. Mean values for the group. Comparation between initial and final values

Global Postural System Values	Mean	p
Cervical initial	12.850 ± 4.0119	p<0.001
Cervical final	9.217 ± 2.6826	
Dorsal initial	16.677± 5.0800	p<0.001
Dorsal final	13.150 ± 3.6003	
Lumbar initial	8.387 ± 1.9819	p<0.001
Lumbar final	6.820 ± 15555	

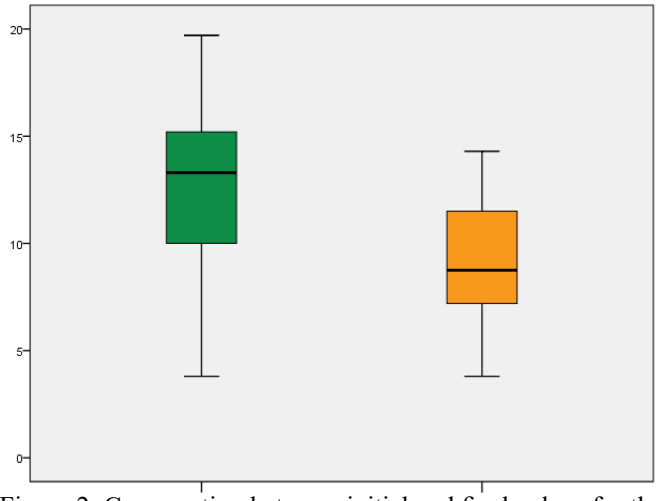

Figure 2. Comparation between initial and final values for the cervical curve

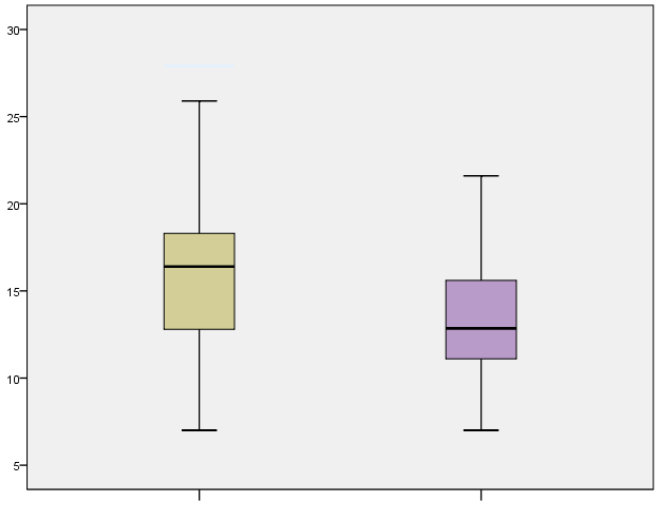

Figure 3. Comparation between initial and final values for the dorsal curve

For the dorsal curve we observed a statistically significant improvement p<0.001. The distance between the plumb line and the apex of the dorsal kyphosis decreased from a mean value of 16.677 to 13.150.

For the lumbar curve we observed a statistically significant improvement p≤0.000. The distance between the lumbar lordosis apex and the vertical that touches the buttock deceased from a mean value of 8.387 to 6.820.

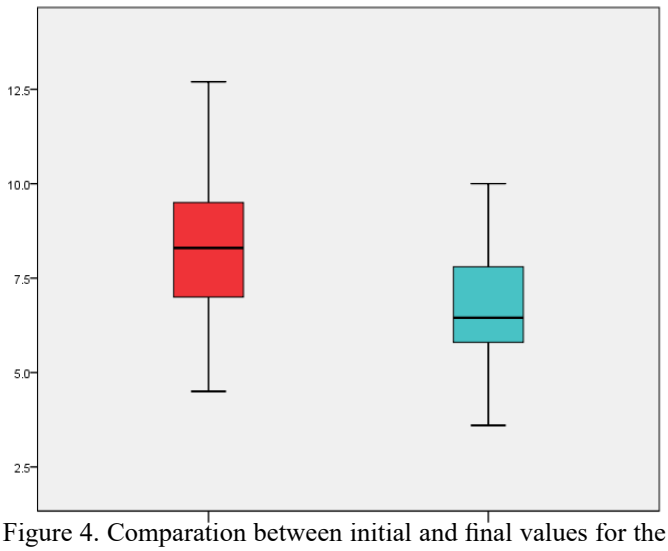

Figure 4. Comparation between initial and final values for the lumbar curve

Discussion

The benefits of an exercise program are universal for all children. Exercise is the cornerstone for a healthy lifestyle and a disability should not preclude children from active participation (Wilson 2002).

As with the able-bodied population, sports can be a significant component of an active lifestyle for children who have disabilities, bringing with it all the benefits (Wilson 2002).

Children with visual impairment have severe problems in posture as a consequence of the habitual positions that the children do to adapt to their condition. This affects their daily living skills and mobility because their movements are restricted and they sometimes experience pain as a result of poor posture.

Aerobic activities had a positive impact on the postural condition of the children with visual impairment (Jovelyn 2011).

Elementary movements, performed through dryland and especially water exercises, had a good effect on correcting the body's posture of blind and partially sighted persons (Damira et al 2018).

Water activities have a great effect upon improving the notion of the body and the segments that compose it, makes breath control easier, contributes to the control of head movement, relaxation, increased strength and muscular endurance, flexibility, mobility, self-esteem, confidence and facilitates social inclusion (Rodrigues, 1997; Souza, 1994).

Swimming in this way has been of great importance to the overall development of people with visual impairments, it can be practiced at any age and physical condition, bringing benefits that directly influence their daily activities, encouraging and facilitating the social interaction of people (Abrantes et al 2006).

In our study blind and visually impaired children practiced swimming exercises twice a week for 60 minutes each session. We observed a significant improvement for all the values we measured, the participants posture improved considerable.

We consider that a swimming and swimming exercises enriches the movement experiences of blind people and contributes considerable to posture awareness.

Therefore, swimming as a physical activity is recommended for people with visual impairment , as this is a sport that allows for independence and autonomy of its practitioners, and provide many benefits that are linked to safety and quality of life (Abrantes et al 2006).

Conclusion

Swimming has a positive effect upon the posture of visually impaired and or blind children.

Swimming has positive effect in improving sagittal deviations of the spine for visually impaired and or blind children.

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References

Alotaibi AZ, Alghadir A, Iqbal ZA, Anwer S. Effect of absence of vision on posture. J Phys Ther Sci. 2016 Apr;28(4):1374-7. doi: 10.1589/jpts.28.1374. Epub 2016 Apr 28.

Abdullah Z, Abrantes GM, Luz LMR, Barreto MM. Natação paraolímpica: manual de orientação para professores de educação física – Brasília: Comitê Paraolímpico Brasileiro. 2006; pp 48

Barlow W. Anxiety and Muscle Tension. Modern Trends in Psychosomatic Medicine. 1955.

Coughlan GF, Fullam K, Delahunt E, Gissane C, Caulfield BM. A comparison between performance on selected directions of the star excursion balance test and the Y balance test. J Athl Train. 2012 Jul-Aug;47(4):366-71. doi: 10.4085/1062-6050-47.4.03.

Carroll TJ (1961). Blindness: What it is, What it Does, and How to Live with it. Boston: Massachusetts, 1961.

Deliceoğlu G, Çavuş TP, Karaman G, Kocahan T, Tortu E & Tekçe A. Goalball Antrenmanının Kadın Goalball Paralimpik Takımının Kuvvet, Denge ve Esneklik Parametrelerine Etkisinin İncelenmesi. Gaziantep Üniversitesi Spor Bilimleri Dergisi. 2017 2(1), 74-84.

Damira VH, Izet B, Slavenko L, Muhamed T & Dženana I. Effects of Four-Month Exercise Program on Correction of Body Posture of Persons with Different Visual Impairment, J. Anthr. Sport Phys. Educ. 2018; 2: 15–18.

Dig-o, Jovelyn F.. "Aerobic Exercises: A Corrective Measure to Postural Defects of Children with Visual Impairment." International Journal for Cross-Disciplinary Subjects in Education 2 (2011): 543-549.

Gesell R. Developmental Diagnosis. In: Hoeber PB. 1949.

Horak FB. Clinical measurement of postural control in adults. Phys Ther. 1987 Dec;67(12):1881-5. doi: 10.1093/ptj/67.12.1881.

Jeon BJ, Cha TH. The effects of balance of low vision patients on activities of daily living. J Phys Ther Sci. 2013;25(6):693-696. doi:10.1589/jpts.25.693.

Rodrigues CA. Natação como terapia na paralisia cerebral. Faculdade de Ciências do Deporto e Educação Física, Porto. 1997.

Ross RT. Transient monocular blindness. Can J Neurol Sci. 1977; 4: 143–150.

Souza PO. Esporte na Paraplegia e Tetraplegia. Editora Guanabara Koogan S.A. 1994.

Stambough JL, Dolan D, Werner R, Godfrey E. Ophthalmologic complications associated with prone positioning in spine surgery. J Am Acad Orthop Surg. 2007 Mar;15(3):156-65. doi: 10.5435/00124635-200703000-00005.

de Pádua M, Sauer JF, João SMA. Quantitative Postural Analysis of Children With Congenital Visual Impairment. J Manipulative Physiol Ther. 2018 Jan;41(1):62-70. doi: 10.1016/j.jmpt.2017.07.016. Epub 2017 Dec 8.

Miller J. Vision, a component of locomotion. Physiotherapy. 1967; 53: 326–332.

Nakamura T. Quantitative analysis of gait in the visually impaired. Disabil Rehabil. 1997 May;19(5):194-7. doi: 10.3109/09638289709166526.

Narvila B, Kulsa M. Postural assessment for people with severe visual impairment, SHS Web of Conferences. 2014; 10, 00028.

Wilson PE. Exercise and sports for children who have disabilities. Phys Med Rehabil Clin N Am. 2002 Nov;13(4):907-23, ix. doi: 10.1016/s1047-9651(02)00030-x.

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