

## **Aerobic Exercises: A Corrective Measure to Postural Defects of Children with Visual Impairment**

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### **Abstract**

*Lack of movement or incorrect movement can lead to postural defect. Children learn how to move by imitation but this mode of learning is not viable for children with visual impairment. Visual deficits affect mobility and it causes postural defects. This underscores the critical importance of conducting research along this area to find out how movement can be facilitated and how the movements can correct postural defects.*

*The experimental research was conducted with a group of young children in the elementary level. It was found out that they do have problems with posture and flexibility which limits mobility. The assessment is a collaborative effort of the main researcher who is a Physical Education and Special Education teacher and a physical therapist. The Philippine Physical Fitness Test was used to assess flexibility and the Assessment of Posture was conducted by a physical therapist, using the scapular slide test and postural analysis.*

*Results showed that after a few months, aerobic exercises had effectively reduced the problems. Therefore, dance aerobic exercises are corrective measures to postural defects.*

### **1. Introduction**

A young child with visual impairment has little reason to explore interesting objects in the environment and, thus, may miss opportunities to have experiences and to learn. This lack of exploration may continue until learning becomes motivating or until intervention begins.

It was noted that children with severe visual impairment do not have sufficient visual acuity to easily participate in everyday activities. They experience difficulties with locomotion, social interaction and communication. Noonan & McCormick [8].

Overcoming the barriers could only be possible when there is proper implementation of interventions to cater to the child's total development through analysis of the curriculum to cater to all areas of human development, including physical development.

It is imperative to note the characteristics of these children with visual impairment that impede their holistic development. Because of their visual problems, the children hesitate to discover their surroundings, therefore leading to their limitation to perform physical activities. This further result to having physical fitness level below those of sighted peers. They also manifest delayed fundamental motor patterns and skills. As a consequence, physical growth and maturation may be impaired, too.

One potential barrier to exploration and physical development is their postural condition that affects their mobility.

During the initial physical assessment conducted by the researcher and the physical therapist, to confirm the presence of postural defects among children with visual impairment, it was found out that almost all of them have postural deformities which varies. Most of them have sway back posture, lordosis, kyphosis, scoliosis and forward head bending.

Motor deficits have tremendous impact on a child's mobility throughout his/her own environment. The National Eye Institute [7] in its "Report of the Visual Impairment and Its Rehabilitation Panel" explained that research is beginning to clarify how visual impairment affects mobility. For instance, visual impairment reduces walking speed, increases the number of collisions with objects and people in the environment, and increases perceived mobility difficulty, the cognitive demands of walking, and driving difficulty as well. In addition, visual impairment can lead to an increased risk of falling and fear of falling, an elevation in crash risk when driving, and, in general, reduced mobility and loss of independence. Despite the fact that orientation and mobility can address the mobility difficulty, it is imperative for the child to develop confidence by trying to explore possible motor activities.

Visual problems also lead to problems with academic performance. The initial stage of cognitive development according to Jean Piaget as cited by Huitt [3], is the sensorimotor stage.

In this stage, infants construct an understanding of the world by coordinating sensory experiences (such as seeing and hearing). With the absence of the sense of sight, understandably, there is a limitation in the child's cognitive development.

On the other hand, the performance of academic requirements may lead to postural defects. Children with low vision hold their head in an awkward position when reading. Sometimes they hold a book or other objects in an atypical position to have a clearer vision. The children's limited bodily actions and impaired balance development eventually lead to postural defects. The use of book stand, positioning the child in the classroom for better vision and better lighting can be helpful to reduce the atypical positions that may cause further postural defects.

The aforementioned reasons made the researcher interested in discovering the possible affect of dance aerobic activities to the flexibility and posture of children with visual impairment, which are essential to make movement more comfortable.

## **2. Research design and methodology**

This study used the experimental design because it is the most appropriate type of research to find the effect of aerobic exercise to the physical flexibility level and postural condition of the children with visual impairment.

The respondents had undergone the pretest, posttest design.

The respondents were subjected to the pretest which was conducted before the aerobic exercise program was implemented and the posttest was conducted after the twelve week implementation of the aerobic program.

The pretest, posttest was based on the Philippine Physical Fitness Test, Mequi [6] and the Assessment of Posture was conducted by a physical therapist, using the scapular slide test and postural analysis. Norkin and Levangie [9]

## **3. Data gathering tools**

The tools that were used in the gathering of data were the Philippine Physical Fitness Test and the Scapular Slide Test and Postural Analysis.

In preparing the appropriate data gathering tools, the researcher tried to review related literature on children with visual impairment and found no exact study where the tool could be patterned from. The Brockport Physical Fitness Test by Winnick & Short [14] is an example of a criterion-referenced, health-related fitness test that was validated for youth with visual impairments. It may be an ideal assessment tool but the validity of the tool considering the differences in the physical structure of the Americans and Filipinos might be affected. Because of this, the researcher instead opted to use the Philippine Physical Fitness test. The Scapular Slide Test and Postural Analysis were conducted by a physical therapist and the instruments do not require further validation because these are accepted assessment in physical therapy.

## **4. Data gathering procedure**

All the children were subjected to a pre-test that was conducted by the physical therapist for the scapular slide test and the researcher herself for the physical fitness test. After that, the aerobic exercise program was conducted. The researcher was supposed to conduct the study for three months but she had to extend until five months because of some disruptions of classes like semester break.

The same tool was administered for the post-test by the physical therapist and the researcher. Informal interviews were elicited to verify the results and to supplement the different data already obtained.

## **5. Summary of findings**

The discussion focused on the following topics:

- Flexibility level of children with visual impairment before and after the aerobic activity.
- Postural condition of the children with visual impairment before and after the aerobic activity.

### **5.1. Postural problem of children with visual impairment before aerobic exercises**

Magee [5] identified postural deficits such as lordotic posture, sway back posture, kyphotic posture and scoliosis.

Most of the children with visual impairment experienced severe problems on their posture. The majority of the measurements divulged that the distance from the midline is more than 5 inches which indicates winging of the scapula (shoulder blade).

The largest muscle near the scapula is the trapezius muscle. When the upper and lower fibers contract together, they rotate the scapula laterally round a point approximately half way along the spine, the glenoid socket turning is free upwards and forward. This rotary action is of importance in the movement of raising the arm above the head when the children recite and when hanging clothes to mention a few affected daily living skills.

Although it is necessary to know the muscles affected when there are postural deviations, it is more important to note the effects of the weakening of these muscles. The performance of daily living skills is affected. The curriculum for children with disabilities includes daily living skills. In the performance of daily living skills, all the movements of the arm such as abduction, rotation and extension are involved. The study showed that the efficiency of the performance of activities such as sweeping, washing clothes and dishes, combing hair and others is affected by postural defect.

It was also discovered that most of the children have kyphotic posture. Understandably, the nature of the impairment requires them to lean their head forward to listen to the sound clearly. Moreover, the excessive use of the arms when manipulating the cane caused the winging of the scapula and forward head posture.

Forward flexion of the thoracic spine accentuates a thoracic scoliosis often not recognized in standing erect position. The test then was done by the physical therapist who viewed the child from behind in a 90 degree forward stance position, both arms dependent (hanging loosely), palms facing each other, both legs parallel, and knees fully extended.

Scoliosis had been found to be another area of concern. Scoliosis is a lateral curvature of the

spine and this type of postural deformity is the most visible spinal deformity. However, according to Caillet [1] functional curves may be transient or fairly persistent, but have no structural changes. Functional scoliosis is usually caused by habitual posture.

When the alignment of the spine was measured, the result confirms a severe problem on this area as it established an imbalance of the spine which also validates the presence of scoliosis. The habitual posture with the manipulation of the cane may have caused the problem.

The aforementioned postural deviations need remediation. Scholl [11] suggested that teachers; teach motor skills that involve moving through space to increase mobility skills, specify directionality and laterality and include corrective exercises to remediate postural deviations.

### **5.2. Flexibility level of children with visual impairment before the aerobic activity**

Gross motor skills are pre-requisites to the optimum discovery of his surroundings. Moreover, gross and fine motor skills are essential for later school learning particularly to orientation and mobility. Scholl [11]. These motor skills facilitate the exploration and manipulation of objects and are necessary as well for the manipulation of cane. The gross motor skills can be developed in the dance aerobic activities, which is the reason behind the choice of activity for the research.

Despite the significance of gross motor activities to the developmental processes in young children with visual impairment, the percentage such movement activity should occupy in the children's daily routine is still not based on sound research findings, neither is the intensity of such motor activity known.

One of the areas of gross motor skills is flexibility; the ability to move a body part to a full range of motion.

The children with visual impairment experience a mild problem in their trunk lift. This test reveals the strength and flexibility of the low back extensor muscles. One of the biggest muscles located at the lower back is the erector spinae. The main bulk of the erector spinae crosses the secondary lumbar curvature of the spine, and is responsible for maintaining the curvature in the erect and sitting positions.

Weakening of this area would lead to low back pain and postural deformities because the visually impaired child will attempt to find more comfortable positions to ease back pain. In the children's attempt to do so, there is a greater tendency to practice improper ways of sitting and standing. Such execution will become habitual and would sooner or later lead to poor posture.

The ease in extension and flexion of the trunk is necessary in the performance of daily living skills such as washing clothes and sweeping. During walking, the erector spinae contracts to steady the vertebral column on the pelvis. This action is readily seen and felt. Problems with erector spinae lead to low back pain, lumbar instability which affects future pregnancy. Walking is also affected and the child experiences trouble when lying flat on bed, prolonged sitting, and standing.

Another flexibility test is the "sit and reach," which measures the flexibility of the hamstring muscles and to some degree the lower back.

The hamstring muscles bend (flex) the knee. They also act to straighten the hip, as in the motion of moving the thigh backwards. They are extremely important in power activities such as running, jumping, and climbing. Sedentary individuals can get by with quite weak or de-conditioned hamstrings but normally, children need strong hamstrings as they run, jump and climb in their attempt to explore the things around them.

The shoulder stretch has varied results. The right has a moderate problem while the left is severe. Naturally, the result would really tend to be similar with other sighted counterparts because people usually use the right arm more than the other. More so with the visually impaired who use the right arm more often as they use the cane.

Koenig and Holbrook [4] concluded that blindness imposes three basic limitations on the individual; the range and variety of experiences, the ability to get about, and the control of the environment and the self in relation to it. Because of these restrictions, an individual relates to and learns from the world through the remaining senses specially the sense of hearing and touch.

As Fitchner [2] posited, "the hand is the eye of the blind." This means that touch is

the most important sense to use when the vision is absent. The part of the body that is frequently used to touch something is the hand. When asked about the commonly used hand, the children said that it is the right. Since it is frequently exercised, the child experiences a minimal problem on its flexibility. Right hand dominance is not a very serious problem but too much dependence and exercise of the right over the left would lead to certain problems on posture.

The flexibility test on "sit and reach" indicated minimal problem. However, the minimal problem would inhibit social activities, too. If they do not feel comfortable to move, their tendency is just remain in a corner which hampers their opportunity to mingle with other individuals.

The finding corroborates with Koenig and Holbrook [4], who concluded that children with visual impairment demonstrates delays in developmental areas that were dependent on or greatly influenced by vision such as motor skill, spatial relationships and tactile exploration.

### **5.3. Postural condition of children with visual impairment after the aerobic activities**

Good posture means many alignment that most favors function; it means position that requires the least muscular work to maintain, which puts the least strain on muscles, ligaments and bones. Thibodeau & Patton[13]. Good posture can have a considerable effect to children with visual impairment as it allows them to move freely and with ease.

After the aerobic activity, most components of the scapular slide test reveals "no problem" or "mild" problems. This totally negates the previous result during the pre-test which are mostly "severe."

Forward bending test, the level of scapula, elbow and shoulders were checked to find out if the respondents have postural deviations. Higher level on any side indicates scoliosis. Such condition was established during the pre-test. The post-test showed a considerable decrease in the percentage of children with postural deviations.

The findings clearly show that the aerobic activities had a positive impact on the postural condition of the children with visual impairment.

#### 5.4. Flexibility level of children with visual impairment after the aerobic activity

The finding discloses that the children with visual impairment do not have problem with their flexibility level along trunk lift, sit and reach and shoulder stretch right after the aerobic exercise program. The children with visual impairment do not have any problem with their trunk lift which indicates that the low back muscles such as the erector spinae, which is responsible for maintaining the curvature of the spine in the erect and sitting positions, is established. Walking and other related activities then become better for the visually impaired.

Their ability to perform sit and reach without difficulty is also signifying the proper contractions of the hamstrings during activities such as running and jumping. The ability to stretch the shoulder would also establish the children's capacity to move the arm freely.

These are all sign of better mobility which eventually helps the children perform daily living skills better.

Furthermore, for children who are blind, activities of daily living demand increased energy; and the need to be fit might be even greater.

In a recent study, Robinson [10] found that students with visual impairments had lower levels of self-determination particularly in the area of physical education. Sherrill [12] emphasizes the importance of self-concept in the performance of physical activities.

Physical activity levels of children who are visually impaired can be improved therefore by improving comfort and success of movement.

#### 6. Conclusions

In the light of the implications discovered in this study, the following conclusions are drawn:

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.

Their flexibility level is not a serious problem because children are by nature flexible.

An aerobic exercise program is an effective therapeutic intervention to check postural

deviations among children with visual impairment.

#### 7. Recommendations

Based from the conclusions derived from the study, the following are strongly recommended:

Early assessment of the posture of children should be made to prevent the progressive effect of the condition. Parents, teachers and medical practitioners should report deviations in posture.

Proper intervention program for the correction of posture should be a collaborative responsibility of the physical education teachers, physical therapists, parents, and classroom teachers.

The innate physical potentials of children with visual impairment such as flexibility could be used as a springboard in checking postural deviations. Exercises that require flexibility should be part of their physical education activities.

Encourage participation of children in school activities that require movement with music such as dancing to develop their self-esteem and social ability.

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