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Aerobic Exercise Responses and Blood Pressure Measurement of Individuals with Intellectual Disability in Ibadan

Tessy Onogimesike ANGBA
National Open University of Nigeria, Uromi Community Study Centre, Uromi Edo State Nigeria

ABSTRACT
The benefits of physical activities are universal for all including those with intellectual disability. Individuals with intellectual disability are mostly neglected and hardly exercised. Hence, the opportunities for improved health and wellness are limited. Paucity of data that could guide ameliorative measures also presents another challenge. Participants were 65 individuals with intellectual disability drawn from four schools for the handicap in Ibadan and were assigned into three experimental groups (Down syndrome, Autism and Cerebral palsy) and control group. Data were analysed using Analysis of Covariance, Analysis of Variance and Scheffe post-hoc test. There were significant differences in the physiological variables of systolic blood pressure ($F_{(2, 62)} = 15.3$; $p < 0.05$), between the experimental and control groups. Therefore continuous exercise for the intellectually disabled individuals should be an integral part of the physical education curriculum.
Key words: Intellectual disability, Quality of life, Physiological parameters

INTRODUCTION

There are different classes of disability, but intellectual disability is a special class in the division. Individuals in this category are of persons with certain and prominent limitations in mental functioning, communication, personal care and social skills (Batshaw, 2000). Batshaw further asserts that intellectually disabled children are much slower than the average child at learning, speaking, walking and personal care or needs. Intellectual disability is usually characterized by a low intellectual functioning level of intelligence quotient (IQ), mostly below 70-75 and this exists concurrently with significant limitations in two or more of the adaptive skills such as communication, self care, home living, social skills, community use, self direction, health and safety, functional academics, leisure and work (Merrick, 2004). Eni-Olorunda (2001) notes that of all the categories of children with special needs such as the deaf, the visually impaired, the learning disabled and the orthopaedically impaired, intellectually disabled individuals are the most neglected. Mba (1995) points out that universally, families are concerned about their image in the society, and as such instead of identifying with their intellectually disabled children, prefer to hide them at home, which invariably contribute to their late recognition for education and physical activity. Onwuchekwa (2005) describes intellectually disabled children as a heterogeneous group by virtue of their intellectual limitations. She further asserts that the heterogeneity of this group is usually apparent even to the casual observer because they may be grossly deformed and immobile. She claims that emotionally, they are disturbed and disruptive, immature and uncooperative. She further observes that some might be unable to feed themselves while others may not be able to travel on public transport. She then posits that variations in these children are due to the wide range of aetiological conditions, which are responsible for the handicaps. She concludes that the number of the children with intellectual disability may be as numerous as the range of the aetiological factors and that the great discrepancies among the intellectually disabled children are determined by the location and extent of the brain damage. Merrick (2004) asserts that persons who are intellectually disabled have been found by many researchers to be a population with deficient physical fitness measures, which result from inactive lifestyle, lack of awareness of the positive effects of physical exercise and lack of motivation for any motor activity. Although intellectual disability remains a source of emotional pain and shame to many families, the intellectually disabled, like the average person, need regular physical activity to maintain healthy lifestyles. According to Healthy Children 2010 Report (2002), the intellectually disabled are more unlikely to participate in sustained or vigorous and rigorous exercise than people without disabilities. Therefore, children with disabilities tend to be weaker and are more susceptible to early fatigue than their physically active peers. They have higher metabolic, cardio-respiratory and mechanical costs of mobility, which lead to early fatigue and decreased exercise performance.

The Special Olympics Incorporated's (2001) work on the health needs of the intellectually disabled has facilitated the study of the prevention of intellectual disability and has also shown that intellectually disabled individuals' health status is on the decline despite gains in life expectancy achieved in the field of medicine. Work by Maria, Stephen, Jeffrey & Kharasch (2004) has shown increased and undetected morbidity in groups of people who are intellectually disabled and have highlighted inadequate diagnosis and treatment of specific

medical conditions including heart disease, hypothyroidism and osteoporosis. Man has always had to cope with individuals who are less endowed with the ability to learn and function in the society as the greater majority of the normal people. However, the limitations of these individuals are solely because of their inability to develop sufficient intellectual capacity to cope with societal or environmental demands and the inability to exist independently of constant supervision and support from others. These groups of individuals are referred to as the intellectually disabled if their conditions come before the age of eighteen years, a period by which the brain is expected to have been fully developed (Merrick, 2004).

There are three classes of the intellectually disabled: The Totally Dependent, The Trainable and the Educable (Mba, 1995). The Federal Government of Nigeria in the National Policy on Education (2004) classifies them as the bedridden, the trainable and the educable. Although there are different categories of intellectual disabilities, which include Down syndrome, Autism, Prader-Willi Syndrome, Williams Syndrome, Fragile X, Inborn Errors, Cerebral Palsy, Neural Tube Defect. Only Down syndrome, Autism and Cerebral palsy will be examined for the purpose of this study and this is because they are easily accessible in schools. Down syndrome is the most common and easiest to identify. It is a chromosomal condition of intellectual disability, which is as a result of genetic aberration, which leads to the formation of 47 chromosomes instead of the normal 46. The additional but unnecessary chromosome disrupts the normal development of the body and brain. However, to confirm Down syndrome in an individual, a chromosome test is carried out on the individual. Individuals suffering from Down syndrome are characterized by poor strength; poor muscle mass and high percent body fat and so are predisposed to cardiovascular health problems (Andriolo, 2007; Hernandez, 1996).

Autism is an abnormality that starts in early childhood with very debilitating effects on social and communicative skill development. The cause of autism is yet to be discovered, so it is not preventable and has no known cure or any effective treatment. Its symptoms are quite heterogeneous but involve deficits in social relatedness and communication. It also includes the presence of restricted interests and repetitive behaviours (Sigma & Spence, 2005).

Cerebral Palsy is basically a disorder of movement and posture due to non-progressive abnormality of the immature brain. It is a condition in which the part of the brain controlling movement and posture does not develop properly. Though the brain continues to develop into early adulthood, the crucial events of its development occur during intrauterine life and early childhood (Batshaw, 2000). However, work done by Maria, Stephen Jeffrey and Kharasch (2004) has discovered an increase in maximal oxygen consumption, physical work capacity and aerobic power after an aerobic training for intellectually disabled individuals.

Varella, Sardinha & Pitetti (2001) revealed a significant improvement in the physiological variables of adults with intellectual disability in the intervention group following some days of exercise. Infact, Tsimaras, Giagazoglou, Fotiadou, (2003) revealed a significant increase in cardiovascular function of individuals with intellectual disability after a twelve-week period of sustained exercise. Wang (2003) research on individuals with intellectual disability revealed that exercise is beneficial to individuals with intellectual disability both in terms of health and lifestyle. Rosenthal-Malek & Mitchel (1997) asserted that individuals with intellectual disability may experience increase in attention span, on-task behaviour and level of correct responding after a moderate aerobic activities. Soper (1994) revealed that physical activity-based programme is easy to implement and has been shown to be effective in controlling many types of inappropriate behaviours associated with intellectual disability.

Down syndrome

Down syndrome is the most common and readily identifiable chromosomal condition associated with intellectual disability. It is caused by a chromosomal abnormality: for some unexplained reason, an accident in cell development results in 47 instead of the usual 46 chromosomes. This extra chromosome changes the orderly development of the body and brain. In most cases, the diagnosis of Down syndrome is made according to results from a chromosome test administered shortly after birth. People with Down syndrome are first and foremost human beings who have recognizable physical characteristics and limited intellectual endowments which are due to the presence of an extra chromosome 21 (Uong et al, 2001) Chromosomes are the materials that store people's genetic information. Each person inherits 23 chromosomes from their mother and twenty-three chromosomes from their father. Sometimes an accident occurs and one of the parents gives an extra chromosome. In addition, Batshaw (2000) says three types of chromosomal abnormalities lead to Down syndrome trisomy 21 (which accounts for about 95% of individuals with the disorder), translocation (which accounts for 4%) and mosaicism (which accounts for 1%). Trisomy 21 results from non disjunction, most commonly during meiosis 1 of the egg, Translocation Down syndrome involves the attachment of the long arm of an extra chromosome 21 to

chromosome 14, 21 or 22 mosaic trisomy implies that some but not all cells have the defect, resulting from non disjunction during mitosis of the fertilized egg.

Cerebral Palsy

Cerebral palsy refers to a disorder of movement and posture that is due to a non-progressive abnormality of the immature brain. Although the brain continues to grow into early adulthood, the crucial events of its development occur during intrauterine life and early childhood. Event of conditions that disturb the usual unfolding of this process can result in cerebral palsy and may also produce several other associated disabilities including intellectual challenge, seizures, visual and auditory impairments, learning difficulties, and behavior problems (Batshaw, 2000). The brain near the lateral ventricles is especially vulnerable to injury at 26 – 32 weeks gestation (Volpe, 1990). The blood vessels in this area bleed easily during this time, resulting in damage to the adjacent white matter, which contains neuronal connections importance in many aspects of motor control. Destruction of these connections most commonly results in problems of muscles tone and motor control in the legs, called spastics diplegial. This abnormalities that destruct regulation and maintenance of the later stages of pregnancy may set into motion a series of parallel or synergistic pathological event that result in both preterm birth and periventricular white matter injury and subsequent cerebral palsy (Adinofi, 1993; Levinton, 1993). The second group of children with Cerebral palsy includes those born at term. Compared with those born prematurely, these children are small for gestation age or have malformation inside and outside the central nervous system. However, improvements in the care of infants have made this condition rare in developed countries. A number of brain imaging techniques are available to help define the anatomical correlates of cerebral palsy (Barnes, 1992).

METHODOLOGY

At the conceptualization of this study, an approval was obtained from the University of Ibadan Research Ethical Review Committee. The research design for this study was pretest, posttest control group experimental design. Participants were made up of sixty five (65) purposively selected individuals who are intellectually disabled from Home School for the Handicap, Ijokodo, Cheshire Primary School, Poly Road, School for the Handicap, Gate and servant of Charity, all in Ibadan, Nigeria. Different categories of intellectual disability that were used include the Down syndrome, Autism and Cerebral Palsy this Children whose class of disability ranges between Mild (IQ 55-65) and Moderate (IQ 40-54) were further randomly divided into experimental and control groups. The descriptive statistics of mean, standard deviation, range and inferential statistics of analysis of covariance were used to analyze the obtained data at 0.05 alpha level.

Hypothesis 1:

There will be no significant difference in the blood pressure measurement among Down syndrome Autism and Cerebral palsy after 10 weeks of aerobic exercise programme.

Table 1: ANOVA on Systolic B.P among Down syndrome Autism and Cerebral palsy

Source	SS	Df	Ms	F	Sig
Between Groups	126.09	2	63.04	1.35	.27
Within Groups	2006.51	43	46.6		
Total	2132.6	45			

Significant at 0.05 level

Table 2: ANOVA on Diastolic B.P among Down syndrome Autism and Cerebral palsy

Source	SS	Df	Ms	F	Sig
Between Groups	53.5	2	26.7	.77	.46
Within Groups	1487.7	43	43.5		
Total	1541.3	45			

Significant at 0.05 level

Tables 1 and 2 results show that an observed F-ratio (2, 62) = 1.35 P> 0.05 for systolic and F-ratio (2, 43) = 0.77 P> 0.05 for diastolic was not significant. Therefore the null hypothesis which states that there will be no significant difference in the blood pressure measurements of Subjects in the different categories of Intellectually Disabled individuals after 10 weeks of aerobic exercise programme was not rejected.

DISCUSSION

The result on blood pressure measurements shows that the aerobic exercise programme has effect on the systolic blood pressure. The mean value also revealed a reduction in the experimental group while the diastolic value did

not change the mean value for diastolic shows a slight reduction. The study is in line with Fernhall & Otterstetter (2003) who reported reduced blood pressure in individuals with intellectual disability after some weeks of aerobic exercise programme. A 13-week intervention programme result reported by Petteti & Tan (1991) showed significant decreases in response to intervention. Similar reduction were also noted in a study by Lavay, Zody, Solko, & Era (1990) who investigated the effect of a cardiovascular fitness programme on mental retardation in adults with systolic P<.02; Diastolic P<.001. It was interesting to note that blood pressure readings from this study were lower than average of 120/80. In-fact, from this study one can conclude that participation in combined aerobic activities will significantly improve the blood pressure. The result comparing the blood pressure of subjects in different categories revealed no significant difference. Although researches have been done on the effect of exercise on the blood pressure measurements, there is still paucity of research on Blood pressure measurement among the categories of intellectual disability.

CONCLUSION

The bane to achieving optimal health for individual with intellectual disability is often the lack of knowledge held by a person's support system. People with intellectual disability are not generally encouraged by those around them to exercise, join health clubs, or participate in sporting events. However, it is possible for persons with intellectual disability to vastly improve their physical condition and quality of life. This study looked at the effect of ten weeks of aerobic exercise programme on the quality of life and physiological parameters of intellectually disabled children in Ibadan.

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