EFFECT OF AEROBIC EXERCISE PROGRAMME ON BODY COMPOSITION AND CARDIORESPIRATORY PROFILES OF INDIVIDUALS WITH INTELLECTUAL DISABILITIES IN IBADAN, NIGERIA

Tessy Onogimesike Angba (Ph.D)
Faculty of Education,
National Open University of Nigeria
tangba@noun.edu.ng

ABSTRACT
People with Intellectual Disability (ID) constitute a vulnerable social group, making their physical health improvement a primary concern to all involved with their care. The aim of this study was to investigate the effect of aerobic exercise programme on body composition and cardiorespiratory profiles of intellectually disabled individuals in Ibadan. The quasi-experimental design was used for the study with a sample of 65 intellectually disabled individuals drawn from 4 intellectually disabled institutions in Ibadan metropolis. The descriptive statistics comprising mean, standard deviation and range were used to analyse data. Analysis of covariance (ANCOVA) was also computed on the pretest-posttest values for each experimental and control groups to determine the effects of the training on the participants in each group by comparing each experimental group with the control group based on the variables under study. All variables were tested at 0.05 level of significance. Two hypotheses were tested and the results show that exercise is effective on the body composition of subjects with F-ratio $(2, 62) = 189.2, P<0.05$ and also significant on the cardiorespiratory profile with F-ratio $(2, 62) = 80.02, P<0.05$. Individuals with intellectual disability should always be encouraged to participate in exercise as it would help reduce obesity and improve their cardiorespiratory profile. Therefore, all stakeholders including parents/guardian of Individuals with intellectual disability should encourage them to be involved in regular exercise for improved physical fitness. Also, more exercise programmes should be developed for the intellectually disabled children with respect to their health and quality life.

Keywords: Intellectual disability, Cardiorespiratory profile, Physical activity, Aerobic exercise, Body composition

INTRODUCTION
Intellectual disability also known as developmental disability or mental retardation, is a generalized neurodevelopment disorder characterized by significantly impaired intellectual and adaptive or behavioural functioning. The increasing rate of obesity and cardiorespiratory disorders among children and adults across the globe has been the subject of recent research. However, there are scarcity of data on this subject in individuals, especially individuals who are intellectually disabled in this part of the world especially Nigeria. Studies have reported the presence of obesity, motor and cardiorespiratory difficulties in children with intellectual disability during their early development (Ament, Mejia, Buhlman, Erklin, Caffo & Mostofsky...
2015), and also the risk of inactivity in this population due to social and adaptive behavioural deficits (Jacquelyn, Hatch-stein, Babette, Zemel, Divya, Heidi, Mary, Sheela & Andrew, 2016). These specific deficits could reduce possibilities of these children is participation in physical activity (Veronique, Marion, Lea, Flavie, Anne & Michel, 2018).

Body composition, according to Prentice (1999), refers to both the fat and non-fat components of the body. The percentage of the total body weight that is composed of fat tissues is known as percent body fat, while the non-fat or lean tissue including muscles, tendons, bones and connective tissues are referred to as either “fat-free mass” or lean body mass (weight). The fitness file as quoted by Igbafe (2002) said that body composition describes the percentages of fat, bone and muscle in the body. According to Housh and Housh (2003), body composition is the amount of fat and fat free mass in individual’s body. The authors further explained the evaluation procedures considering the body as a two-component system. The fat component of the body principally represents the lipids constituents of the body and is found in adipose tissue and to a much lesser extent in neutral tissue.

Prentice (1999) insisted that an ideal body composition consists of low fat and high muscle mass. De-Ridder (2003) cautioned that “Extremely low level of body fat can result in health problems like amenorrhea in women (less than 3 periods per year)”. Amenorrhea has been linked to increased risk of stress features (bone mineral loss) and premature osteoporosis over extended periods of time. The body needs certain amount of fat for normal physiological and metabolic functions as in essential lipids (phospholipids) needed for cell membranes formation, thermal insulation and storage and transport of fat-soluble vitamins (A, D, E, and K). This should be why Prentice (1999) had earlier recommended that women should stay between 17% and 25%fat while men should stay between 5% and 17% fat in order to strike a balance between health and optimum performances.

Studies have reported risk associated with excess accumulation of fat and an increase in body fat has been reported among intellectually disabled children (SOI, 2001; Simila & Niskanen, 1991; Bell & Bhate, 1992; Rubin, Rimmer, Chicoine, Braddock, & McGuire, 1998). Body composition is used to assess the excess adiposity and cardio metabolic risks in children and adults with intellectual disability. Studies have also indicated that increased body mass index (BMI) is common among intellectually disabled individuals (Hsieh & Heller, 2014.) There are evidences that high body mass index (BMI) negatively affects motor performance and physical fitness in children who are intellectually disabled (Davis, Zhay & Hodson, 2011). Children with intellectual disability perform poorly on motor and physical activities (Eichstaclt & Lavay, 2016).
The relationship between BMI and motor performance of this population has not been well explored. Information about body composition and cardiorespiratory fitness evaluated by a standardized method in the intellectual disability (ID) population is scarce in developing nations like Nigeria. It is hypothesized that this population is at greater risk for obesity and cardiorespiratory deficits than their peers due to high rate of sedentary lifestyle. Individuals with ID are estimated to be about 3% of population across the globe and obesity will accelerate the limitations already experienced as part of the disability, consequently hindering opportunities for maximal integration into society. Other studies have reported beneficial effects of exercise for adults and children with ID, citing statistically significant reductions in weight (especially among those with mild ID) and BMI scores, (Golubovic, Maksimovic, Golubovic & Glumbic, 2012). Improved physical fitness can promote a more active lifestyle, reduce health problems, and increase the likelihood of paid employment and non-institutionalized community living for individuals with ID (Frey, McCubbin, Hannigan-Downs, Kasser & Skaggs, 2008). Group exercising can help people with ID increase self-esteem, reduce body weight and may be important paths for socialization and cooperation with other people sharing the same disability (Guidetti, Franciosi, Gallotta, Emerenziani & Baldari, 2010).

Therefore, there is a need to better understand factors that contribute health and wellbeing of these individuals. The aim of this study was to investigate the effect of aerobic exercise programme on body composition and cardiorespiratory profiles of intellectually disabled individuals in Ibadan.

**Research questions**

The following research questions guided the study:

1. What is the difference in the body composition of participants in the experimental and control groups of intellectually disabled individuals in Ibadan after 10 weeks of aerobic exercise programmes?

2. What is the difference in the cardiorespiratory profile of participants in the experimental and control groups of intellectually disabled individuals in Ibadan after 10 weeks of aerobic exercise programmes?

**HYPOTHESES**

The following hypotheses were formulated for the purpose of this research:

**H01**: There is no significant difference in the body composition of participants in the experimental and control groups of intellectually disabled individuals in Ibadan after 10 weeks of aerobic exercise programmes.
The null hypothesis (Ho): There is no significant difference in the cardiorespiratory profile of participants in the experimental and control groups of intellectually disabled individuals in Ibadan after 10 weeks of aerobic exercise programmes.

**METHODOLOGY**

The quasi-experimental design was used for the study. Participants with intellectual disability were divided into experimental and control groups. The experimental groups went through six weeks’ exercise programme while the control group did not go through any exercise programme.

The population for this study was made up of all intellectually disabled individuals in Ibadan metropolis. A total of 65 intellectually disabled individuals drawn from four (4) intellectually disabled institutions in Ibadan metropolis were recruited for the study. The purposive sampling technique was used to recruit the entire participants because of their existing peculiar characteristics, while simple random technique with the use of fish bowl method was used to assign the participants into experimental and control groups.

An approval was obtained from the University of Ibadan Research Ethical Committee to carry out the study. Each parent and participant received information about the purpose and nature of the study. After reading and understanding the information, a statement of attesting to informed consent was approved, obtained and signed by the child and by his parent and/or legal or institutional guardian.

The instruments used to gather data for the study were:

**Weighing Scale:** A Hanson model portable weighing scale (made in Ireland was used to measure total body weight in kilograms. The range of graduation is 0 to 180 kg. Weight was recorded to the nearest 0.1 kg.

**Stadiometer:** This was used to measure subjects’ heights

**Skinfold Caliper:** The lange skinfold caliper (model 3003), made by Cambridge Scientific Industries Incorporated, U.S.A.; was used to measure skinfold thickness of the participants. The caliper is graduated from 0mm to 67mm, with a constant pressure of 10g/mm.

**Stop Watch:** Digital stopwatch was used to time all activities as necessary.

**Rockport walking test:** The school athletic field and digital stop watch were used to determine the cardio-respiratory test.

The instruments for this study were validated and standardized instruments. However, the researcher’s supervisor, and research assistants cross-checked the instruments to ensure that they were in proper working condition before usage and all instruments were set at zero marks. A reliability coefficient for weighing scale at 0.96 and 0.99 for the sum of skinfold (Baurmgartner & Jackson, 1999). The test re-test reliability co-efficient for Rock-port walking...
To ensure that the instruments measured what they were supposed to measure, the researcher, her supervisor and her assistants recalibrated the instruments against other standardized equipment.

A pilot study was carried out before the main study. Seven (7) intellectually disabled individuals from Cheshire Home, Ibadan who were not part of the main research were used for the pilot study. This enabled the researcher and her assistants to be well acquainted with the testing instruments and also establish the feasibility of the study.

The research assistants comprised 10 students from the Department of Human Kinetics and Health Education, University of Ibadan, who were certified members of International Society for Anthropometry and Ki anthropometry.

The procedure for this study involved first, weight and height measurement of the subject. Weight (kg) was measured by digital electronic scale (Hanson), calibrated daily, and stature(cm) was used on a well-mounted stadiometer (Holtian) with the participants in light clothing without shoes by trained research anthropometrists using standard techniques (Jacquelyn et al, 2016). Height and weight measures for the calculation of BMI were obtained. The body mass index for each respondent was calculated and from0 the result of the body weight and height, the BMI classifications of normal, overweight, and obese were determined using international standards (Ferhall & Jritetti, 2000).

The skin fold thickness was measured to determine the percent body fat. The lange skinfold caliper was used to measure two skinfold sites of triceps and calf skinfold as recommended by ISAK (2001). All measurements for the skinfold thickness were taken on the right side of the body (ISAK, 2001). The anatomical sites were located and marked. The researcher grasped a double thickness of skin firmly with the thumb and forefinger, pulling the fold slightly away from the muscular tissue, and the skinfold caliper held perpendicular to the fold at approximately km? below the finger fold. The caliper was closed around the fold slowly and the reading was taken to the nearest 0.5mm for 1 or 2 seconds after the caliper jaws was close tightly on the skinfold. Three readings were taken and the mean of the two closest readings was used for the skinfold measurement. The anatomical sites that were used are as follows:

The fold is raised with the left thumb and index finger on the marked mid acromiale-radiale line. The fold is vertical and taken parallel to the line of the upper arm. The skinfold was on the most posterior surface of the arm over the triceps muscle when viewed from the side. For the measurement, the arm was relaxed with the shoulder joint slightly externally rotated and the elbow extended by the side of the body.
The subject assumed a relaxed standing position with the arms hanging by the sides and the right foot placed on the box. The right knee was bent at about 90°. The subjects’ right foot was placed on a box with the calf relaxed. The fold was parallel to the long axis of the leg.

**Equation for Computing Percent Body Fat of Participants:**

Equation by Lohman (1992) was used to estimate relative body fat from the sums of triceps and calf skinfolds. % fat = 0.610 \( \sum \text{sf} + 5.0 \) (female)

% fat = 0.735 \( \sum \text{sf} + 1.0 \) (male)

**Where** \( \text{sf} \) = sum of skinfold.

**Cardio-respiratory fitness test**

Rockport walking test (1 mile walk) procedure was adopted for this slowly. The participants were asked to walk round the field. On the command (‘To’ They moved the body as fast as possible, based on the amount of time it took them to complete the 1-mile of brisk walking, the exercise heart rate was taken at the end of the walk for 15 seconds which was later multiplied by 4. The time it took them to complete the task was also recorded. Variables such as age, gender and body weight were also included in calculating the cardio-respiratory endurance. A fast time and a low heart rate indicate a high level of cardio-respiratory endurance. Equation for computing cardio-respiratory fitness test was given by:

\[
\text{VO}_{2} = 132.853 - 0.1692 \times \text{Weight (in kg)} - 0.3877 \times \text{Age (in y)} + 6.315 \times \text{Gender} - 3.2649 \times \text{Time (in min)} - 0.1565 \times \text{HR (at the end of walk)}
\]

for female, 1 for male: HR at the end of walk.

The physical fitness training programme consisted of ten-week aerobic activities using the Interval-training programme. The exercise intervention programme began with warm up activities of 2 minutes and cool down of 2 minutes. The exercise was carried out three times per week at alternate days (MON, WED & FRI). The exercise was for 30 minutes from week one to week six and gradually increased to 35 minutes from week seven to week ten with a cool down period of 2 minutes. The exercise training programme include two nursery rhyme games and several activities aimed at reducing the fat mass and improving the cardiorespiratory fitness such as jogging-walking, running, jumping in and out of a rope circle, throwing, clap and catch in a circle, and blow up ball on, release it and catch. A feedback phase (~5 minutes) to explore the child’s satisfaction level was given. Each activity in the central phase was given initially for 6–10 repetitions; the number of sets and repetitions of each exercise was gradually increased when the children were able to perform it with ease. The exercise was done following instructions from the researcher and trained assistants. The data were analysed using the descriptive statistics of range, mean and standard derivation while inferential statistics of analysis of covariance (ANCOVA) was used to analyse the data collected for the study at 0.05 level of significance.
RESULTS

The demographic data of participants and descriptive statistics comprising mean, standard deviation and range for the variables are presented in Tables 1 and 2 respectively. Analysis of covariance (ANCOVA) was computed on the pretest-posttest values for each experimental group and the control group to determine the effects of the training on the participants in each group by comparing each experimental group with the control group based on the variables under study. All Variables were tested at 0.05 level of significance.

Table 1: Descriptive of Physical Characteristics of Subjects

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>S.D</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>1.43</td>
<td>0.17</td>
<td>0.70-1.76</td>
</tr>
<tr>
<td>Pre weight(kg)</td>
<td>46.36</td>
<td>13.9</td>
<td>14.0-78.0</td>
</tr>
<tr>
<td>Post weight(kg)</td>
<td>43.0</td>
<td>13.7</td>
<td>12.0-78.0</td>
</tr>
<tr>
<td>Age Exp. (yrs)</td>
<td>20.8</td>
<td>7.6</td>
<td>9-42</td>
</tr>
<tr>
<td>Age Con(yrs)</td>
<td>17.2</td>
<td>7.5</td>
<td>10-34</td>
</tr>
</tbody>
</table>

Key: m=meters  
Kg=kilogramme  
Yrs=years

Table 1 shows the physical characteristics of Subjects. It shows heights mean of 1.43 ±0.17 with a range of 0.07- 1.76. The table shows a pre-weight reading mean of 46.36 ± 13.9 with a range of 14.0-78.0 while the post-weight reading mean of 43.0 ±13.7 with a range of 12.0-78.0. The experimental group was the oldest with a mean of 20.8 ± 7.6 years and a range of 9-42 years while the control group had a mean of 17.2± 7.5 with a range of 10-34 years respectively.

Table 2: Body Composition and Cardio-Respiratory Profile Parameters of Subjects

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m)</td>
<td>Experimental Pre</td>
<td>22.15 ± 4.54</td>
<td>9.86-34.24</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>19.77 ± 4.29</td>
<td>8.63-31.35</td>
</tr>
<tr>
<td></td>
<td>Control Pre</td>
<td>22.0 ± 3.71</td>
<td>16.12-31.16</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>22.0 ± 3.71</td>
<td>16.12-31.16</td>
</tr>
<tr>
<td>% fat</td>
<td>Experimental Pre</td>
<td>17.93 ± 2.93</td>
<td>11.03-23.91</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>14.12 ± 3.06</td>
<td>6.62-20.25</td>
</tr>
<tr>
<td></td>
<td>Control Pre</td>
<td>17.24 ± 3.11</td>
<td>11.71-231</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>17.50 ± 3.04</td>
<td>11.71-23.91</td>
</tr>
<tr>
<td>MAXVO2 (ml. kg⁻¹. min⁻¹)</td>
<td>Experimental Pre</td>
<td>21.10 ± 10.6</td>
<td>-4.12-35.11</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>51.73 ± 12.38</td>
<td>15.32-71.11</td>
</tr>
<tr>
<td></td>
<td>Control Pre</td>
<td>19.63 ± 8.28</td>
<td>3.13-36.45</td>
</tr>
<tr>
<td></td>
<td>Post</td>
<td>27.54 ± 10.79</td>
<td>6.40-46.81</td>
</tr>
</tbody>
</table>

Table 2 shows the descriptive statistics of body composition of Subjects. The table shows the means pre-test of Body mass index of 22.15 ±4.54 with a range of 9.86-34.24 and post-test mean of 19.77±4.29 with a range of 8.63-31.35 while the control group has a mean pre-test of 22.0±3.71 with a range of 16.12-31.16 and a post-test mean of 22.0±3.71 with a
range of 16.12-31.16 and a post-test mean of 22.0±3.71 a range of 16.12- 31.16. The experimental pre-test of percent body fat mean is 17.93 ± 2.93 with a range of 11.03- 23.91 and post-test mean of 14.12±3.06 with a range of 6.62- 20.25 while the control group has a mean of 17.24±3.11 with a range of 11.71- 23.91 and a post-test mean of 17.50±3.04 with a range of 11.71- 23.91. The results revealed that BMI and %fat reduced as a results of the exercise programme. The experimental pre-test of maximum oxygen uptake has a mean of 21.10 ±10.6 with a range of -4.12- 35.11 and post-test mean of 51.73±12.38 with a range of 15.32- 71.11 while the control group has a mean of 19.63±8.28 with a range of 3.13- 36.45 and a post-test mean of 27.54±10.79 with a range of 6.40- 46.81. The Mean results revealed an improvement in the maximum oxygen uptake of individuals with intellectual disability following the exercise programme.

**HYPOTHESIS TESTING**

**Hypothesis One (H₀₁)**

There is no significant difference in the body composition of participants in the experimental and control groups of intellectually disabled individuals in Ibadan after 10 weeks of aerobic exercise programmes.

**Table 3: ANCOVA of Body Composition of Subjects**

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>SS</th>
<th>Df</th>
<th>Ms</th>
<th>F</th>
<th>P</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariate</td>
<td>217.64</td>
<td>1</td>
<td>217.64</td>
<td>189.2</td>
<td>0.000</td>
<td>Sig.</td>
</tr>
<tr>
<td>Explained</td>
<td>671.0</td>
<td>2</td>
<td>335.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>71.38</td>
<td>62</td>
<td>1.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>742.4</td>
<td>64</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level*

The analysis of covariance in table 3 on the effects of aerobic exercise programme on the body composition of intellectually disabled individual in the experimental and control groups shows that the F-ratio(2, 62)=189.2, P< 0.05 was significant. Therefore, the null hypothesis which stated that there is no significant difference in the body composition of participants in the experimental and control groups of intellectually disabled individuals in Ibadan after 10 weeks of aerobic exercise programmes was rejected.

**Hypothesis Two (H₀₂)**

There is no significant difference in the cardiorespiratory profile of participants in the experimental and control groups of intellectually disabled individuals in Ibadan after 10 weeks of aerobic exercise programmes.
Table 4: ANCOVA of Maximum Oxygen Uptake of Subjects

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>SS</th>
<th>Df</th>
<th>Ms</th>
<th>F</th>
<th>P</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariate</td>
<td>7145.2</td>
<td>1</td>
<td>7145.2</td>
<td>80.02</td>
<td>0.000</td>
<td>Sig.</td>
</tr>
<tr>
<td>Explained</td>
<td>11331.5</td>
<td>2</td>
<td>5665.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>5535.9</td>
<td>62</td>
<td>89.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>16867.5</td>
<td>64</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

The analysis of covariance in table 4 on the effects of aerobic exercise programme on the maximum oxygen uptake of intellectually disabled individuals in the experimental and control group shows that the F-ratio $(2, 62) = 80.02$, $P < 0.05$ was significant. Therefore, the null hypothesis which stated that there is no significant difference in the cardiorespiratory endurance of participants in the experimental and control groups of intellectually disabled individuals in Ibadan after 10 weeks of aerobic exercise programmes was rejected.

**DISCUSSION**

The results on body composition show that the aerobic exercise programme had effect on the body composition of individuals with intellectual disabilities after going through the 10-week exercise programme. The mean value shows a reduction in the experimental group’s body composition after the 10 weeks of aerobic exercise programme while the control group shows no reduction. This means that aerobic exercise programme can serve as a very effective solution to the problem of obesity in any intellectually disabled individuals. The study is consistent with the findings of Frey and Chow (2006) that exercise is useful as 20 participants who were intellectually disabled had an initial mean weight of 85kg but after taking part in an aerobic programme found their weight reduced significantly by the end of 6 weeks to a mean weight of 81.6kg. Their mean body mass index score also dropped from 33.5 to 31.9. Although research by Frey and Chow (2006) revealed that intellectually disabled children were at increased risk of obesity when compared to women in general population. He further said the most able and moderately able people with intellectual disability were at a greater risk of obesity, while the least able at greater risk of obesity and physically inactive. This study is consistent with Frey and Chow (2006) who reported high percentage body fat for the intellectually disabled individuals.

Research by Rubbin, Rimmer, Chicoine, Braddock, and McGuire (1998) also revealed a consistent result that exercise is found as a veritable tool in reducing percent body fat. Overweight and obesity represent two primary concerns relating to intellectually disabled individuals. In Rubbin et al’s retrospective study, overweight and obesity are highly prevalent in Down syndrome American population (45% in male and 56% in female) when compared to the general population.
The result on percent body fat shows that the aerobic exercise programme had effect following the 10-week aerobic exercise programme. The mean value in the experimental group shows reduction in the percent body fat after the ten weeks of aerobic exercise programme while the control group shows no reduction in the mean but a slight addition of 0.3. The result obtained is in line with several studies that have reported a positive aerobic conditioning of individual with intellectual disability (Frey et al, 1999). Some positive results were obtained by Varela, Sardinha and Pitetti (2001) after a sixteen-week indoor rowing aerobic exercise programme.

The result on maximum oxygen uptake shows a significant difference between the experimental and control group after 10 weeks of aerobic exercise programme. The mean value for those in experimental group revealed an increment in the mean after 10 weeks of aerobic exercise programme, while the control group shows no increase. The findings revealed that exercise is of immense benefit to intellectually disabled individuals.


**CONCLUSION**

Although individuals with Intellectual disability are hardly exercised and among the group with high physical fitness deficit, this study corroborates many researchers on the beneficial effect of exercise to everyone including individuals with intellectual disabilities. Based on the findings of this study, it is established that the aerobic exercise programme improved the body composition and cardiorespiratory profile of the individuals with intellectual disabilities following the 10-week programme.
RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

1. Individuals with Intellectual disability should always be encouraged to participate in exercise.

2. All stakeholders including parents/guardian of Individuals with Intellectual disability should encourage them to be involved in regular exercise for improved physical fitness. More exercise programmes should be developed for the intellectually disabled children with respect to their health and quality life.

REFERENCES


