Original Research Article

Effectiveness of physical education programme on component of abdominal strength endurance amongst physically challenged pupils at Kolwal special school Kenya

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Abdominal strength Endurance is important to good health because low levels are associated with bad posture and low back pain in later years. Children who are physically challenged have lowered fitness levels than their peers due to limited opportunities to exercise (Rehabilitation International, 1991, UNICEF 2013). The objectives of this study was to: (1) Assess the demographic characteristics of the Study participants. (2) Examine impact of physical Education Programme on Anthropometric measurements of the study participant. (3) Evaluate the impact of physical Education programme on abdominal strength endurance of physically challenged children in Kenya across gender. In this study abdominal strength endurance of children with physical disabilities were measured using Project UNIQUE fitness test by Winnick and Short. The study sample comprised of 17 boys and 14 Girls (N=31) and the study site was Kolwal special school in Kenya. Pretest and posttest design was used in this study. A pretest was carried out two weeks after school opening and a posttest eight weeks later at the end of the treatment period. Data collected was descriptively analyzed and one way ANOVA computed to determine the significance of difference between pretest and posttest means on the dependent variables under investigations by gender. The Null hypothesis were rejected at <0.05 level of significance. The results established significant difference between pretest and posttest on abdominal strength Endurance and body weight. Boys performed better than Girls, but both genders registered marked improvements after the treatment period. However, the program had no impact on participants’ height. Study recommends that P.E teachers and program developers to design programs that enhance capacity of children with physical disabilities in order to improve health-related fitness components. Study further recommends that physical Education should be encouraged in all schools catering for children with disabilities and that this current study to be replicated on other disability categories e.g. those with Visual Impairments and intellectual disabilities in Kenya.

Key words: Physically challenged, abdominal strengths endurance and physical education programme.

INTRODUCTION

Physical Education has been recognized as an important part of the total educational process for all (WCEFA, 1990). It influences the development of organic, neuromuscular and emotional as well as physiological development of the learner, World Health Organization WHO(2008) set recommended target of physical activity for
adults at 30 minutes of at least moderate intensity a day on a 5 or more days per week. Physical activity and sport is increasingly being used as treatment complementing the conventional methods of Physiotherapy; it develops strength, coordination and endurance. A wide variety of Sports can be enjoyed by persons living with disabilities and be of benefit to them e.g. Horse Riding, Skiing, Swimming, Athletics, Power Lifting, Wheelchair basketball, Wheelchair Tennis, Tricycle etc. (International Paralympic Committee-IPC, 2014): confidence, communication skill can be improved. Physical activities may yield social and psychological benefits such as establishing social networks, facilitating social integration, bridging cultural differences, pave way for employments and overcome prejudice and discrimination (Sherrill, 2004); Nash (2010) opines that input from physiotherapists and qualified sports therapists is needed in order that exercise plans take into account individual client needs; that is safe exercise for clients with movement disorders prevalent among persons with physical disabilities.

The development of motor ability has been attributed to inadequate opportunities to move and exercise as reported in the Rehabilitation International Journal of 1991. According to Auxter et al. (1993) persons with physical disabilities need to be in the best health status to overcome discrimination and gain social acceptance. The role of play which is important for social, psychological and motor development is limited for these children. Persons with Physical disabilities have lower fitness levels with regard to their abdominal Strength endurance than their able bodied peers, and so they have to work harder at their fitness levels (Sherrill, 2004). The P.E. lessons offered in the school is an excellent way of integrating the persons with physical disabilities into situations in which they can gain social acceptance and adaptation to community living, reduced anxiety, enhanced mood, positive benefits of mental health and self-esteem (Nash, 2010; Favazza et al., 2013; Vogt et al 2015; Bukhala, 2012).

It is on the basis of these that this study investigated the effectiveness of the Physical education programme on the health-related Fitness component of abdominal strength endurance of children with physical disabilities in Kenya.

Objectives of the Study

The objectives of this study were to: (1) Assess the demographic characteristics of the Study participants. (2) Examine impact of physical Education Programme on Anthropometric measurements of the study participant. (3) Evaluate the impact of physical Education programme on abdominal strength endurance of physically challenged children in Kenya after eight weeks exposure to the physical education programme.

Conceptual framework

This study adopted and used the conceptual framework developed by Franks and Howley (1997). The two proponents of this framework states that physical fitness is an asset of attributes that people achieve relating to their ability to perform physical activities. The overall concept and definition should be as it is relevant to health. Similarly quality adapted physical education programme that enables physically challenged persons acquire knowledge. Skills and attitude will lead to improvement in skill performance and effective participation during P.E lessons. On the other hand physical education programmes that do not lead to acquisition in physical fitness skills or prepare physically challenged learners to participate in P.E programmes will produce pupils who are unfit and are unable to participate effectively in PE lessons (Kishner and Fishbourne, 1995).

Figure 1. below represents a diagrammatical representation of the consequences of both effective and ineffective physical education programme.

Effective PE programme leads to improvement in performance in fitness variable of abdominal strength endurance of the learners, while ineffective P.E programme leads to little or no improvement in the fitness variable of abdominal strength endurance of the learners. The concept is relevant to this study in that it predicts a positive relationship between effective programme and improvement on abdominal strength endurance fitness variable of the study participants. That is, participation in 8 weeks of regular P.E programme would lead to increased performance on abdominal strength endurance fitness variable of the learners. The model is relevant to this study due to its prediction of improvements under an effective P.E programme of primary school going pupils.

METHODOLOGY

Research design

This was a Quasi-experimental research using pretest and posttest design. This quasi-experimental research design was appropriate for this study because the results can be applied directly in the field unlike laboratory setting (Thomas and Nelson, 2013). The pre and posttest data of the case group was done in three stages: pretest, participation in physical education programme for 8 weeks and posttest at the end of 8 weeks. The researcher established the abdominal strength endurance fitness levels of the subjects before they were exposed to the P.E programme. The work was able to determine any differences in abdominal strength endurance levels after 8 week exposure to the P.E programme. The dependent variable investigated were the abdominal strength endurance and body weight, as well as participation in the PE programme. The independent variable was the demographic characteristics and participation in the PE programme. Since Physical Education is compulsory in Kenyan primary schools, a control group/comparative group was not feasible in this study as all school children are exposed to the P.E curriculum.

In order to establish the entry status of the subjects at the
start of the programme, a pretest was done, at the beginning of the term in January 2014 after the subjects had returned from a 5 week vacation. The pupils were then exposed to physical education programme for 8 weeks. A posttest was administered after this period to determine if there were changes on body weight and abdominal strength endurance fitness levels. The study used one site which was based at Kolwal special primary school for the physically handicapped in Migori county, Kenya. The choice of the study site was purposive due to the fact that it had the highest number of persons with physical disabilities concentrated in one setting. The target population at the study site comprised of all the 88 persons with physical disabilities at the study site. Purposive sampling technique was used to obtain the sample size. Subjects in classes 5, 6 and 7 consisting of 17 Boys and 14 Girls who were 31 in number all of whom were involved in the study (N=31). The subjects had the following physical disabilities: amputations, spina bifida, cerebral palsy, Osgoodsch latter disease, muscular dystrophy and autism Spectrum Disorder (ASD). This constituted 35.2% of the target population. According to Gay(1976) a 20% sample is acceptable in small populations. The researcher used intact classes with gender and age already designated.

**METHODS AND MATERIALS**

A fitness protocol chart (Appendix A) overpage was used for data collection. Information was recorded on demographic characteristics and abdominal strength endurance fitness level of the study participants. The pupils performance on the dependent variables were assessed using a selected test item from the project UNIQUE physical Fitness test battery of Winnick And Short(1985).

**Abdominal Strength Endurance**

This Health-related component was measured by the total number of correctly preformed modified sit ups in 1 minute (60 secs) and total counts recorded by the research assistants in the presence of the researcher. Total counts were taken as the final score for each subject. The number of correctly performed sit ups which was done with hands placed at the side of the head, knees bent at 90degrees and the feet secured by the research assistants. A full sit-up is defined as touching the knees with the elbows and returning to the shoulders. This was taken as the final score both at pretest and posttest. Three research assistants who were the PE teachers were trained for one day in assessing
Table 1. Age distribution of pupils with physical disabilities participating in physical education program in Kenya

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Frequency</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>15</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>16</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>17</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>18</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

the variables under the study. See appendix A below for Fitness protocol Chart over page

**Test Administration and measurement methods**

**Anthropometric measurements:**

(a) Age was recorded from the individual record of pupils in the school register.
(b) Height was taken by the use of a tape measure, which was suspended on a pole
(c) Weight (kg) for each pupil was taken without shoes and in light clothing from weigh in machine
Children's participation was observed and the time and nature of activities were recorded by the research assistants in the presence of the researcher using an observation score sheet. See Appendix B above.

**Data analysis and presentation**

Data collected were subjected to statistical analysis by (SPSS) in a computer. Descriptive statistics were used to compute the mean, the standard deviation and percentages for the variable under investigation by gender and across the age groups. One Way Analysis of Variance (ANOVA) was used to compare the pretest and posttest results on the same component. The level of significance was set at 0.05 alpha level. Results was presented in tables, charts and Histograms.

**RESULTS**

**Anthropometric measurements:**

**Age distribution of the respondents**

The study involved 31 (thirty one) pupil of Kolwal special School for the physically handicapped in Migori, County, Kenya. Majority 19% (nineteen) of the participants were 17 (seventeen) years old. 16% (sixteen) were 14 years and 18 years old, 13% (thirteen) were 12, 13, and 16 years respectively, while 10% (ten) were 15 years old. Table 1. below represents age distribution of the study participants From this findings, the physically challenged pupils remain in primary school for a long period (up to 18 years) due to the fact that parents in Kenya still hide children with disability during early years when they are supposed to have joined school, due to stigma and cultural practices. In addition parents also choose to educate the able bodied children first at the expense of a child with disability and as a result by the time they are identified and placed in school they are already overage, Kenya Society for the Physically Handicapped(KSPH 2014).

**Distribution of participants by Gender**

The study involved both Boys and Girls from the school of which 55% of the participants were Boys While 45% were girls. Figure 2 below presents distribution by gender People with disabilities. Particularly children with disabilities do not have equal opportunities and equal access to most aspects of life. This lack of access include basic services such as education and health; this limits their opportunity for social integration, and hence lack sport skills. Female children are more at risk of physical and sexual violence, exploitation, harassment and discrimination compared to their male counter parts. This limit their opportunities for social interaction and development of appropriate sports skills (Gilbert and Bennet, 2012).

Revised UNESCO Charter of physical Education, Physical Activity and Sport which was adopted in November 2015; article 11.3 state that: “Sport for development and Peace initiatives should be inclusive and culture, gender, age and disability sensitive; and include strong monitoring and evaluation mechanisms. They should encourage local ownership of projects and embody the same principles of sustainability and integrity as other physical education, physical activity and sport initiatives”. This issue contributes and makes a strong case for inclusive sport for development in practice, policy and research where boys and girls should have same opportunities. Sport can have a social impact on people with disabilities irrespective of gender and age (Kaufman et al., 2015). Despite this declarations, women with disabilities often experience double discrimination on the basis of their gender and disability. Studies show that 93% of women with disabilities do not participate in sport or physical exercise; and that women make up only a third of
athletes with disabilities because of their reduced status (Parmes, 2007).

In developing countries, the combined interaction of traditional, cultural, gender norms and poverty often result in girls and women's isolation from public life and sport (WHO, 2008). This is compounded by the fact that parents tend to restrict girls' mobility than boys to protect their reputation and safety, thus significantly narrows their public life appearances including opportunities for sport engagement and school attendance.

According to National Women’s Association Journal (2002), a large body of literature documents the prejudice, stigmatization and oppression of women in relation to sport. In many cultures, prejudice against females with disabilities are experienced at very young ages when little girls are not introduced to sport and may be taught that they will not be fit for marriage and childbearing. Therefore, women with disabilities describe themselves as triply disabled (negatively affected by activity limitation, poverty and gender), they are more limited than men in terms of resources and participation (Sherrill, 2004).

Women with disabilities must not only deal with stereotypes and challenges posed by feminity, but also deal with the challenge of disability. Furthermore, culture also tends to view women as fragile and weaker than men, stereotypes which are heightened when a woman has a disability (Smith and Hutchinson, 2005). This makes a strong case for this research in documenting the benefits of exercise on women's abdominal strength endurance levels as supported by the data presented.

**Impact of the programme on participant’s body weight**

The study also measured body weight of the study participants both at pretest and posttest. Majority (77.4%) of the subjects recorded decreased body weight during posttest, while 22.6% recorded no change. In relation to gender, fewer boys registered no change in their body weight compared to girls. This may be due to the fact that females at around puberty have more fat contents than males. This finding suggests that PE programme can reduce body weight of pupils who are physically challenged. This study finding concurs with a study by Kinoti (1998) and Odiango et al (2012) which concluded that physical activity if well programmed and supervised reduces body weight. Figure 3 below represents results of impact of physical education programme on body weight of the participants.

**Performance by Gender on Abdominal Strength Endurance**

In this study, increased number of sit ups between pretest and posttest was an indicator of an increased in the ability to continue repeated instructions. Boys performed better than girls both in the pretest and posttest with a pretest mean of 13.5 counts with a standard deviation of 4.1 and an improved posttest mean score of 20 counts with a standard deviation of 4.4 compared to the girls pretest mean score of 9.3 counts with a deviation of 3.5 and an improved score of 15.3 counts with a standard deviation of 3.6 in the posttest.
Figure 3: Impact of physical Education programme on Body weight of study participants

Table 2. Analysis of health-related fitness component of abdominal strength endurance of pupils with physical disabilities after exposure to physical education programme for 8 weeks

<table>
<thead>
<tr>
<th>Variable unit</th>
<th>pre</th>
<th>post</th>
<th>F-ratio</th>
<th>F-critical</th>
<th>Remarks</th>
<th>Magnitude of improvement</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal Strength</td>
<td>11.22</td>
<td>17.45</td>
<td>30.1</td>
<td>4.17</td>
<td>$</td>
<td>55.4%</td>
<td>0.7</td>
</tr>
<tr>
<td>Endurance</td>
<td>counts</td>
<td>counts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key: S-Significant
Result significant at p<0.05 at df 30

However, both groups performed more sit ups in the posttest compared to pretest.

This analysis is an indicator that the subjects improved on their abdominal strength endurance after 8 weeks exposure to the physical education programme at Kolwal special school. The gender difference in performance could be attributed to their response to training. It is different for the two sexes. Men have a higher inherent capacity to increase muscle mass than women (Sherrill, 2004). However, research has consistently demonstrated that training may lead to improved strength among females. Similarly, muscle hypertrophy is significantly less in females compared to males (Wabuyabo and Wamukoya, 2009). The limitation in women’s response to training is their more rapid heart rates, fewer blood cells and less hemoglobin, small maximal Pulmonary ventilation, less oxygen capacity, lower testosterone, lower oxygen uptake and less muscle mass than in men (Powers and Dodd, 2003).

Impact of physical education programme on Abdominal Strength Endurance of pupils with physical disabilities in Kenya

When data for the entire group of subjects were combined and analyzed, the analysis showed marked improvements by increased number of correctly performed modified sit ups during the posttest as compared to pretest. The subjects improved their abdominal strength endurance by 55.45% magnitude of improvements. The data generated by this study demonstrated that the participants performed more sit ups after the treatment period compared to before treatment. This was a reflection that the physical education programme at Kolwal special school Kenya improved subjects abdominal strength endurance levels after 9 week exposure to the PE programme.

The magnitude of improvements between pretest and posttest on abdominal strength Endurance is as shown in Table 2 above.

This results therefore indicates a strong positive correlation between participation in physical education programme for eight weeks and improvement on abdominal strength endurance levels of the study participants.

DISCUSSION

Reduced body weight and increased abdominal endurance level is a measure of health-related fitness which improves physical activity, thereby resulting in the following benefits...
for the physically challenged; help them handle their bodies under a variety of circumstances, long active living, improved health and assisting in preventing and controlling health problems (Odiango et al., 2012). This is critical for a child with physical impairment which for long has been discriminated against due to attitude and societal stratifications and low skill levels caused by impairments (Favazza et al., 2016; Bukhala, 2012; Katiwa 2012).

Improved physical activity helps the child to achieve optimum physical, mental and social growth through carefully selected activities. On the other hand excessive body weight is a health hazard and has been implicated as contributing to a variety of conditions including hypertension, childhood obesity, hypolipoproteinemia and accident proneness (Miller and Allen, 1989). Vigorous exercise can influence changes in body weight and fat free weight which are important variables in an individual’s body composition.

Strength of abdominal muscles are important in promoting good posture and correcting pelvic alignment both important elements good basic health. This agrees with research by Welk (2008), which isolated the abdominal muscle test for a more accurate indication of strength endurance. This study observes that increased abdominal fitness is important because low levels are associated with bad posture and low back pain. Strength endurance is also important in activities of daily living, maintaining functional health and reducing chances of injuries. Being able to participate effectively due to effective physical education programme; gives the child a feeling of worth and value despite the handicaps imposed on him by the impairments. Exercise has therapeutic value to the physically handicapped. Sport represent the most natural form of remedial Exercise. It restores the physically challenged strength, productivity of mind, self-dignity, self-confidence and comradeship which gives them a completely new outlook in life. Sport in particular physical activity enables persons with physical handicaps perform daily activities with vigor and reduce hypokinetic (movement) problems (Wabuyabo and Wamukoya, 2009).

Furthermore sports is useful in integrating physically handicapped learners in situations which helps them to achieve success, gain approval and improve their level of function. For victims of muscular dystrophy participation in physical activity make these children make new friends who will stick by as he becomes increasingly helpless as the disease progresses. These agrees with study findings by (Odiango et al., 2012; Katiwa et al., 2012) which demonstrated that exercise improve the fitness levels of children with disabilities. Increased muscular endurance is also associated with an actual chemical change by which fuel is made more available, fuel is stored in greater amount and oxygen is more abundant owing to a more adequate circulation of blood through the muscle (Martin and Coe, 1991). Other related studies which agrees with the findings of this study include those of Favazza et al. (2016) on impact of Young Athletes (YA) curriculum of motor ability of preschoolers with disabilities in Kenya, where results indicated that when children with intellectual disabilities are exposed early to learning of motor skills, they can learn and improve their functional ability. This study was also instrumental in changing family perception of this children and include them more in family activities and community programs and also encouraged their parents to take them to school. Other related findings which agree with these findings include those of Vogt et al (2015); Nkatha (2002); Odiango et al (2012); Katiwa et al (2012); Sherrill (2004); Bedell et al (2013); Bukhala (2012). In which physical activities improved health and functional abilities of children with disabilities as well as their social competence and ability to function independently in the community.

CONCLUSIONS AND RECOMMENDATIONS

The study concluded that the PE programme improved the health-related fitness component of abdominal strength endurance of physically challenged pupils and therefore if well implemented and supervised at school level can be used for purposes of enhancing persons with physical disabilities health status at all levels of the education system. The overall findings of the study established that there were significant improvements on body weight and abdominal strength endurance, thus this study recommends that;

- Kenya Society for the Physically Handicapped and Disabled Persons Association of Kenya to carry out a nationwide campaign to create awareness about benefits of physical activities on improving persons with disabilities health, in a country where the potential of children with disabilities is at greatest risk due in part to persistent stigma, negative attitude and an underlying belief about their limited capabilities to learn (Britto et al, 2011). Simply put, health-related intervention for these children is not a luxury but a necessity given the link between psychomotor ability and brain development, self-regulation, language, physical fitness and social development.

- The study further recommends that policy makers and curriculum developers in Kenya at KICD-Kenya Institute of Curriculum Development and other Teacher Training Institutions should encourage the teaching of the physical education program to promote the health of persons with physical disabilities. Physical education programmes should be encouraged in all schools involving persons with disabilities in Kenya.

- There is need to carry out nationwide survey of fitness levels of persons with physical disabilities including larger samples from primary, secondary and universities. This can help to establish national norms for this group which is missing in Kenya. There is also a need to replicate the current study on other categories of special needs groups e.g. visually impaired and intellectual disabilities in Kenya’s learning and training institutions.
ACKNOWLEDGEMENT

The researcher acknowledges with appreciation Prof. Edwin Wamukoya principal of Zetech College, the physical education teachers who were the research assistance at Kolwai special school, the parents of pupils with physical challenges for allowing their children to participate in this study and Mrs. Elizabeth Mse for assistance in shaping this manuscript and Evelyne for typesetting this manuscript.

Competing interests

The authors declare that they have no competing interests

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