Effect of eight-week school-based exercise training on cardiorespiratory fitness and body composition of educable mentally retarded adolescents

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Abstract

Objective: The purpose of this study was to determine the effect of eight-week exercise training on Cardiorespiratory Fitness and body Composition of adolescents with mental retardation.

Materials & Methods: Thirty adolescents students with mental retardation (mean age, 16.9 ± 1.21), were randomly divided into control (n = 15) and experimental group (n = 15). Groups were matched for IQ (mean IQ, 63.07 ± 4.79). The experimental group participated in a selected school-based physical fitness program for eight-weeks. At baseline and after eight weeks exercise training, Cardio-respiratory Fitness and body fat percent and body mass index as Health related physical fitness factors were assessed by special modified tests (Brockport) including 600 yard walk/run test and skinfold test.

Results: Significant improvements were observed in 600 yard walk/run test (p=0.000), body mass index. (p=0.002) and body fat Percent (p=0.014) in the experimental group but not for the control group (p≥0.05).

Conclusion: The Results indicated that Cardiorespiratory Fitness and Body Composition can be improved with a school-based exercise program in adolescents with mental retardation that are exposed to sedentary lifestyle.

Key words: Physical Fitness, Mental Retardation, School based Exercise Training

Introduction

The mentally retarded (MR) population is comprised of a diverse group of individuals, making it difficult to generalize a set of characteristics to the total population (Angelopoulou and et al., 2000). Mental retardation (MR) causes important effects on children’s physical fitness, as well as cognitive activities during life span. Most research in the literature states that children with MR have poor level of physical fitness compared with their nondisabled peers; especially these studies found that children with MR have a low level of cardiovascular endurance (Yılmaz et al., 2009).

Gillespie (2003) indicated that non-disabled children exhibited significantly greater levels of aerobic fitness than did those with MR. One of the fundamental causes of defects in the physical fitness of people with intellectual disability has been reported inactivity and lack of physical activity. It is well known that children with MR have isolation problems in society and it seems, the special conditions of these people and separate them from normal people, is the reason of the lack of engagement in sport and physical activities and consequently a sedentary life (Onyewadume, 2006).
In addition, several studies reported a significantly positive correlation between inactive lifestyles and cardiovascular disease (Havemann, 2010). Therefore, physical activities should be established for children with MR, to develop their health related physical fitness especially cardiovascular fitness.

Rimmer et al, observed significant improvement in cardiovascular fitness and a significant reduction in body weight that people with intellectual disability (Rimmer et al., 2004). Wu et al also studied the effect of health-related fitness programs for people with intellectual disabilities in a disability institution and find out a significant reduction in weight and body mass index (Wu et al, 2010). Lewis and Pinkham, in a case study on a girl with Down syndrome, announced the improving cardiopulmonary function, but no change in flexibility and body weight as a result (Lewis and Pinkham, 2005).

Several studies have studied the effect of exercise on physical fitness of people with intellectual disability but few studies have been performed on the impact of school-based training on physical fitness of students with intellectual disability. The purpose of this study was to determine the effect of eight-week School based exercise training on cardiorespiratory fitness and body composition of adolescents with mental retardation.

Materials and Methods

In this quasi-experimental study 30 educable mentally retarded adolescents aged 15 to 19 years (mean age 16.9 ± 1.21 years) and IQ 50 to 70 (mean, 63.07± 4.79) were selected among 110 children with intellectual disability in Mehre Imam professional life skills training school of Special education of Qom. Students who have a musculoskeletal or special disease and surgery not involved in the study. Selected participants after parental consent, were randomly divided into two groups of experimental group (n=14) and control group (n=15). The experimental group participated in a selected school-based physical fitness program for eight-weeks. At baseline and after eight weeks exercise training, Cardiorespiratory Fitness and body fat percent and body mass index as Health related physical fitness factors were assessed by special modified tests (Brockport) including 600 yard walk/run test and skinfold test. Fernhall et al, showed 600 yard walk/run test is valid and reliable indicator of aerobic capacity, suggesting that this test can be used to predict VO2max in children with mild and moderate mental retardation (Fernhall et al., 1998). Percent body fat skinfold by the YMCA 3-point formula for body composition was measured using caliper (Lawrence, 2000). Experimental Group participated in 60-minute school-based fitness program for eight week by 3 sessions per week in accordance with the recommendations of the Brockport Physical Fitness Test (BPFT) and American College of Sports Medicine (ACSM). Aerobic exercise for 20 minutes and at 50 to 80 percent of maximum heart rate and stretching and strengthening exercises on large muscle groups was 30 minutes. The 5 minute warm up and 5 minute cool-down exercises were considered. Motivational items to encourage participants was also a major part of the program. The control group did not perform certain exercises and Continued the before study process. After 8 weeks, both groups were retested. After the test the normal distribution of data distribution through the Kolmogorov-Asmryynof mean, Paired t-test were used to determine if two sets of data are significantly different from each other. The significant level was set at p=0.05.

Results

In this section, demographic characteristics between experimental and control groups are presented in Table 1 and show that the subjects in the two groups in terms of age, height, weight and IQ were similar conditions:

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Age (year)</th>
<th>Weight (kg)</th>
<th>Height (m)</th>
<th>IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRN</td>
<td>16.9±1.30</td>
<td>63.5±19.32</td>
<td>1.72±0.07</td>
<td>63.07±4.88</td>
</tr>
<tr>
<td>CTL</td>
<td>16.9±1.16</td>
<td>63.3±14.44</td>
<td>1.73±0.10</td>
<td>62.67±5.42</td>
</tr>
</tbody>
</table>

Mean and standard deviation of health-related physical fitness groups for before and after the exercise program is shown in Table 2. In this table, test results of t-test are also given. Experimental group after exercise training program had significant improvement in three tests: 600 yard walk/run test (p=0.000), body mass index (BMI) (p=0.002) and body fat Percent (BFP) (p=0.014).
Cardiovascular-fitness levels of individuals with MR are considerably lower than those of their able-bodied peers (Pitetti, 2001). Low levels of cardiovascular fitness are associated with the early onset and high incidence of cardiovascular and other chronic diseases (Ozmen 2007). In addition, cardiovascular fitness is important for active leisure pursuits and general quality of life (Ozmen 2007). Therefore, the purpose of this study was to determine the effect of eight-week school-based exercise training on cardiorespiratory fitness and body composition of adolescents with mental retardation. After the training program there was a significant improvement in cardiorespiratory fitness factor.


Also Dodd and Shields (2004), Lotan and et al., (2005) Ozmen et al, (2007) Anchuthengil and et al (1992) that studied the effect of only aerobic exercise on cardiovascular fitness in people with intellectual disability were also obtained similar results. As well as, stanisic et al (2012) that investigated the effects of an adapted basketball training program on the physical fitness of adolescents with mental retardation, Their results showed that the specially adapted training program improved the physical fitness of adolescents with mental retardation 6 minute walk distance test and Heart Rate. However they stated this kind of training did not lead to improved body weight or percentage of fat tissue of the adolescent participants. Varela et al (2001) also announced a rowing exercise regimen did not improve the cardiovascular fitness of young adults with Down syndrome.

About body composition, we significant improvement in body mass index (BMI) and body fat Percent (BFP) but Ozmen et al reported no improvements were found in percent body fat by the school-based training program.

It seems that the use of physical activity and exercise programs for people with disabilities like mental affected. Therefore, breeding programs and in accordance with the structural characteristics and psychological fitness of students with intellectual disability, especially in childhood and adolescence, in addition to providing physical and mental health, will prepare them for a better life in society.

Frey et al compared physical fitness levels of trained runners with mild mental retardation and concluded that trained runners with mild mental retardation can achieve high levels of physical fitness comparable to individuals without MR. Through sports training programs as well as positive changes in the physical fitness of students with intellectual disability, especially cardiovascular endurance is observed. For example: basketball training program (Tsikriri et al, 2007; stanisic et al, 2012). Other ways to improve physical fitness in adolescents with intellectual disability are Water exercises and swimming (Yilmaz et al, 2009; Navrakala, 2002) Whole Body Vibration (Gonzalez-Aguero et al, 2013), Treadmill Exercise Training Program (Angelopoulou, 2000), Aerobic Rowing Training (Varela et al, 2001), combined aerobic and resistance exercise training (Mendonca et al 2011).

Adapted Physical education is one of the key areas of education plays an important role in achieving the goals of education. Findings of various researches are shown the effects of exercise on various factors, fitness, postural control and physiological characteristics, mental health and learning skills. As a result, Young people with an appropriate exercise program will have the opportunity to be trained physically and mentally and dexterity. And therefore they can have an active and healthy life when entering adulthood and this shows the importance of physical activity and physical education among these people.
We recommend that children with MR be exposed to similar training programs with hopes of improving their involvement in active leisure pursuits and quality of life, while reducing their risk for cardiovascular diseases later in life. Future studies need to investigate the implementation of this program in other populations (e.g. Down syndrome). To the parents, Educators and officials of Mental Retardation centers and schools, Recommended that provide the conditions to benefit of exercise and physical activities for children with MR.

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Conflict of interest

The authors declare no conflict of interest

References


