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Analysis of the influence of a twelve-month swimming exercise on mentally disabled individuals' physical fitness level

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Abstract
In this study, it was aimed to analyze influence of a twelve-month swimming exercise on mentally disabled individuals' physical fitness level. A total of 28 mild mentally disabled individuals between 14-19 age groups participated the study. According to the results of the study, while there was no statistically significant difference between measurements of body weight, body mass index, sit-reach flexibility, left hand grip strength, extended arm hang on groups, measurements and between groups and their measurements; statistically significant difference was found in body fat percentage values between groups, measurements, and groups and their measurements. There was statistically no significant difference between vertical jump, leg strength, right hand grip strength groups, groups and their measurements, but statistically important difference between measurements was determined. When Isometric push-up and 1 mile run/walk values were analysed, it was noticed that statistically there was no striking difference between groups, measurements, there was statistically meaningful difference between groups and their measurements. When modified curl-up values were analysed, statistically no significant difference was observed between groups, but statistically there was important difference between measurements, groups and their measurements. Consequently, it is necessary to apply new exercise programs and revise existing exercise programs while studying with disabled individuals.

Keywords: Mental Disability, Physical Fitness, Swimming, Exercise.

1. Introduction
The Physical fitness is necessary for exercises and it is universally recognized that it is beneficent for all children [1]. According to data published by schools, the highest population among handicapped students belongs to mentally handicapped children [2]. The reason for low level of physical fitness of mentally handicapped children compared to their peers would be that they practice less physical activity models [3]. Since handicapped children survive a sedentary life style, they are exposed to health risk as well [4]. Amongst physical fitness definitions in the health dimension, body composition, cardiovascular endurance, flexibility, muscle strength and endurance are shown [5]. These parameters are influenced by physical activity and they provide health-related benefits [6]. According to some researchers, sedentary life style among mentally handicapped children could be result of insufficient motor activity and physical fitness. While competency in motions is important in participation into activity [7]; it is also reported that participation of handicapped children into physical activity is privileged subjects of public health [8]. In order to participate in daily life activities and society, it is important for individuals to be independent of others in their basic actions [9]; however, walking and balance problems are common among mentally handicapped individuals [10]. Studies suggest that mentally handicapped individuals are more prone to the risks of falling and injuries in connection with falling [11, 12]. Physical activity has positive effect on obesity, physical performance and health risk factors; and it could develop postural balance of mentally handicapped individuals between 18-45 ages [13]. It is reported that physical fitness is necessary for health. Studies reveal that mentally handicapped individuals have low level of physical fitness in comparison with their non-handicapped peers [14, 15]; and they are statistically in higher risk group in terms of disease, death, and health problem [16]. When mentally handicapped individuals participated in planned exercise programs, their physical

fitness parameters increase [5] and they gain opportunity to have an active life style [17]. Whereas World Health Organization suggests that youngsters are required to perform minimum 60 minute daily physical activity [18]; it is reported that activities can reduce cardiorespiratory and muscle fitness, bone health, anxiety and depression symptoms [19].

The present study is conducted to investigate effect of 12-week swimming exercise on physical fitness levels of individuals with moderate mental handicap aged in the range of 14-19.

2. Materials and methods

2.1 Participants

Subject group of the study is composed of 15 individuals (7 females, 8 males) aged between 14-19; and the control group is composed of 13 individuals (3 females, 10 males), all of whom are mentally handicapped at moderate level. This study was conducted upon approval of the Scientific Researches and Publication Ethic Board of the Dumlupınar University dated with 22.05.2014. Parents of all participant children were informed through form about the study and a written consent was taken from each family about participation in study. It was ensured that all participants received health report for each participant from health institutions before 12-week swimming exercise.

2.2 Level of Intelligence

Before commencement of the study, Weschler Intelligence Scale Test was conducted by the Guidance and Research Center of the Usak City National Education Directorship. Scores obtained through these tests were not published since it is not ethical; only educational diagnosis of participants was presented. Based on these diagnosis studies, it was reported that all participants have trainable intelligence level (50-70 IQ).

2.3 Applied Tests

For physical fitness evaluations of participant individuals, the Brockport Physical Fitness Test (BFUT) was utilized. This Test was developed to support health-related physical fitness of handicapped youngster aged between 10-17, who were attending to the Brockport Special Education Institution and Rehabilitation Service [20].

Height: Height measurements of participants were taken while they are standing on a flat surface with bare foot; their body weights were measured as it is distributed equally on both legs while their toes are adjoined and it was contacting with height measurement tool, while their head is on the Frankfort plan, and arms released from shoulders freely on both sides. Two measurements were taken and their averages were calculated and registered [21].

Body Weight: Measurement of body weight was conducted by means of Jawon Make (Model IOI-353) brand body composition analyzer. This device is a system that has a clean steel surface on which bare foot contacts and is capable of making analysis through 5, 50, 250 KHz frequency from one leg to another [22]. Weight was measured with sensitivity of 0.1 while participants were in a light dress and on bare feet.

Body Mass Index (BMI): The index was calculated based on proportion of height and body weight values. BMI= Body Weight (kg)/ Height^2 [23].

Body Fat Percentage: For Body Fat Percentage measurement (BFP), 4 different regions were (Biceps, triceps, subscapula, and spinailiaca) taken into consideration. Measurement of subdermal fat thickness is performed as skin and subdermal fat is held by thumb and index fingers and pulled along the direction of skin folding while muscle is pulled away. A certain interval time period is waited between measurements and they are recorded until 0.1 cm. Three measurements were taken from each area then their average value is taken into account [21, 23]. BFP values of individuals were calculated based on the Durnin-Womersley formula [24].

Sit-Reach Flexibility: This action was performed while participants are in long sitting position as their feet were leaning on internal side of the board and their knees are tensed. Their arms were on graded board parallel to feet, and their back is perpendicular to the starting position. During measurement, participants made a move toward the front for the four times; then at the last move, the distance reached was recorded in meter. The maximum distance reached by the middle finger on the graded board constituted the test score. Average of two trials was recorded [23].

Vertical Jump: Participants were asked to jump upward as they are geared up with Jump meter on their bellies as their feet adjacent to each other and their body is in straight position and their arms were put up. The measurement was applied twice and the best score was recorded in centimeter [20].

Isometric Push-up: This test was applied while participants are in prone position as their back and body are straight, arms are tensed and hands and feet fingers were contacting with ground. In this test, participant tries to maintain the push-up position taken. In failure to maintain the body position, ongoing test is finalized. Each participant was only given one trial right. The final score is equal to time measured during maintaining this position in seconds [20].

Modified Curl-up: The test was performed as participants lay down on their back and their knees flexed by 90 degree, soles were in contact with the ground, arms are parallel to the body toward knees. They are given only one trial chance. The score is the number of shuttle within 60 seconds time interval [20].

Leg Strength: Participants were asked to apply their maximum strength by legs were brought to extension as their head was in straight position, their shoulders and waist muscles are fixed, knees were in about 45 degree angle. Score is measured as force in kilogram applied to steel wire connected to the dynamometer as an external strength resource. Three measures were taken and their average is taken into consideration [20].

Hand Grip Strength: Measurement is performed in a sitting position while participants' back is straight, they were staring across, and hands were released on sides. They were asked not to contact with dynamometer and to grasp dynamometer without twisting their arms with all of their strength. Score is recorded in terms of applied force in kilogram unit. At the end of each measurement, dynamometer was reset and three measurements were taken for each hand; then their averages were calculated and recorded as score [20, 23].

Extended Arm Hang: This test is performed by grasping a bar while elbow and arms are tensed; body is flat; and eyes staring across. During the test, it was paid attention that arms and legs were tensed and feet were not in contact with the ground. In case body position is distracted, the test was terminated. Participants were given only a trial right. Score is measured as period of hanging time on the bar in seconds [20].

1 Mile Run/Walk (1.609 m): In this test, participants walk or run a mile (1.609 m) within the shortest period of time. This test is used to evaluate aerobic capacity of participants and it is based on the logic that youngster to run or walk this distance by fast steps and in shortest period of time. A trial chance is given on a flat surface; performance is recorded in minute and second [25].

2.4 Swimming Exercise Program

During 12-week swimming exercises, activities performed by the mentally handicapped individuals were prepared based on the Special Olympics Swimming Guide and other resources about swimming [26, 27]. Exercises were performed under supervision of 20 helpers and a head coach who are trained about swimming (60 minutes/3 days/12 weeks).

2.5 Statistical Method

Windows SPSS IBM 21.0 statistical software is utilized in statistical analysis. For statistical analysis, results were displayed as average values and standard deviation. In comparisons, $\alpha = 0.05$ significance level is taken into consideration. In order to determine whether there is significant difference among groups in terms of age and height values, t-test was conducted for two independent groups. Distribution of parameters was investigated by means of Shapiro-Wilk normality test ($n<50$); time-dependent change in all parameters was tested by means of Repeated Measure Anova test in repeated measurements.

3. Results

According to test results, there was no significant difference between average heights of the study group (156.47 ± 10.37 cm) and the control group (162.08 ± 11.67 cm) ($t_{.(26)}$; -1,347). Moreover, there was no significant difference between study group (17.40 ± 1.50 years) and the control group (17.08 ± 1.44 years) in terms of average age ($t_{.(26)}$; 578) ($P>0.05$, Table 1).

According to the study results, while there was no statistical significance found between groups in terms of body weight and BMI parameters, between groups and their measurements (pre-test and post-test) ($p>0.05$); there was statistical difference was found between groups, measurements (pre-test and post-test), groups and their measurements ($p<0.05$) in terms of BFP values (Table 2).

According to research findings, in terms of sit-reach parameter, there was no statistically significant difference found between groups, measurements (pre-test and post-test), groups and their measurements ($p>0.05$). In terms of vertical jump parameter, while there was no statistically significant difference found between groups and their measurements ($p>0.05$); a significant statistical difference was found between measurements (pre-test and post-test) ($p<0.05$). In terms of isometric push-up parameter, while there was no statistically significant difference found between groups and measurements (pre-test and post-test) ($p>0.05$); statistically significant difference was found between groups and their measurements ($p<0.05$) (Table 3).

Based on the results of the present study, in terms of modified curl-up parameter, while there was no statistically significant difference found between groups ($p>0.05$); significant statistical difference was found between measurements (pre-test and post-test), and groups and their measurements ($p<0.05$). In terms of leg strength parameter, while there was no statistically significant difference found between groups, groups and their measurements ($p>0.05$); significant statistical difference was found between measurements (pre-test and post-test) ($p<0.05$). In terms of right hand grip strength parameter, while there was no statistically significant difference found between groups, groups and their measurements ($p>0.05$); significant statistical difference was found between measurements (pre-test and post-test) ($p<0.05$) (Table 4).

According to the results of test parameters of left hand grip strength and extended arm hang**,** there was no statistically significant difference found between groups, measurements (pre-test and post-test), groups and their measurements ($p>0.05$).

According to 1 mile run/walk test parameter, while there was no statistically significant difference found between groups, measurements (pre-test and post-test) ($p>0.05$); statistically significant difference found between groups and their measurements ($p<0.05$) (Table 5).

3.1 Tables

Table 1: T test Results of Groups Regarding to Height and Age

	Groups	***N***	***Mean***	***Sd***	***t***	***Sig.***
Height	*Experimental*	15	156.47	10.37	-1.347	.190
	Control	13	162.08	11.67		
Age	*Experimental*	15	17.40	1.50	.578	.568
	Control	13	17.08	1.44		

*p< .05

Table 2: Variance Analysis Results Regarding to Body Weight, Body Mass Index and Body Fat Percentage

			Groups	***N***	***Mean***	***Sd***	***F***	***Sig.***
Body Weight	*Group*		*Experimental*	15	61.00	3.69	,060	,808
			Control	13	59.67	3.96		
	Measurements		*Measurement 1*		*60.07*	*2.75*	*1.086*	*.307*
			Measurement 2		*60.59*	*2.68*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*61.00*	*3.74*	*1.058*	*.313*
			Measurement 2		*61.00*	*3.66*		
		Control	*Measurement 1*		*59.15*	*4.02*		
			Measurement 2		*60.19*	*3.93*		
Body Mass Index	*Group*		*Experimental*	*15*	*24.67*	*1.24*	*1.105*	*.303*
			Control	*13*	*22.76*	*1.33*		
	Measurements		*Measurement 1*		*23.59*	*0.90*	*1.360*	*.254*
			Measurement 2		*23.84*	*0.93*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*24.66*	*1.23*	*1.046*	*.316*
			Measurement 2		*24.69*	*1.26*		
		Control	*Measurement 1*		*22.52*	*1.32*		
			Measurement 2		*22.99*	*1.36*		
Body Fat Percentage	*Group*		*Experimental*	*15*	*22.72*	*1.34*	*6.438*	*.018**
			Control	*13*	*17.71*	*1.44*		
	Measurements		*Measurement 1*		*20.70*	*.98*	*14.905*	*.001**
			Measurement 2		*19.72*	*1.01*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*23.66*	*1.33*	*12.654*	*.001**
			Measurement 2		*21.78*	*1.37*		
		Control	*Measurement 1*		*17.75*	*1.43*		
			Measurement 2		*17.67*	*1.47*		

*p< .05

Table 3: Variance Analysis Results Regarding to Sit-Reach, Vertical Jump and Isometric Push-up

			Groups	***N***	***Mean***	***Sd***	***F***	***Sig.***
Sit-Reach	*Group*		*Experimental*	15	13.83	1.99	.000	.995
			Control	13	13.81	2.13		
	Measurements		*Measurement 1*		*12.99*	*1.50*	*3.777*	*.063*
			Measurement 2		*14.65*	*1.53*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*12.36*	*2.05*	*2.283*	*.143*
			Measurement 2		*15.30*	*2.09*		
		Control	*Measurement 1*		*13.63*	*2.20*		
			Measurement 2		*14.00*	*2.24*		
Vertical Jump	*Group*		*Experimental*	*15*	*24.53*	*2.66*	*.011*	*.916*
			Control	*13*	*24.11*	*2.85*		
	Measurements		*Measurement 1*		*22.46*	*2.00*	*10.258*	*.004**
			Measurement 2		*16.18*	*2.06*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*22.00*	*2.73*	*1.329*	*.259*
			Measurement 2		*27.06*	*2.81*		
		Control	*Measurement 1*		*22.92*	*2.93*		
			Measurement 2		*25.30*	*3.02*		
Isometric Push-up	*Group*		*Experimental*	*15*	*38.16*	*6.03*	*1.207*	*.282*
			Control	*13*	*47.90*	*6.48*		
	Measurements		*Measurement 1*		*41.42*	*4.94*	*.753*	*.393*
			Measurement 2		*44.65*	*4.65*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*32.53*	*6.74*	*4.660*	*.040**
			Measurement 2		*43.80*	*6.34*		
		Control	*Measurement 1*		*50.30*	*7.24*		
			Measurement 2		*45.50*	*6.82*		

*p< .05

Table 4: Variance Analysis Results Regarding to Modified Curl-up, Leg Strength and Right Hand Grip Strength

			Groups	***N***	***Mean***	***Sd***	***F***	***Sig.***
Modified Curl-up	*Group*		*Experimental*	15	21.76	2.47	2.988	.096
			Control	13	15.50	2.65		
	Measurements		*Measurement 1*		*16.58*	*2.07*	*9.288*	*.005**
			Measurement 2		*20.68*	*1.77*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*17.93*	*2.83*	*7.010*	*.014**
			Measurement 2		*25.60*	*2.42*		
		Control	*Measurement 1*		*15.23*	*3.04*		
			Measurement 2		*15.76*	*2.60*		
Leg Strength	*Group*		*Experimental*	*15*	*35.83*	*5.01*	*.187*	*.669*
			Control	*13*	*39.01*	*5.38*		
	Measurements		*Measurement 1*		*33.57*	*4.08*	*16.379*	*.000**
			Measurement 2		*41.26*	*3.49*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*31.34*	*5.56*	*.456*	*.506*
			Measurement 2		*40.31*	*4.75*		
		Control	*Measurement 1*		*35.81*	*5.97*		
			Measurement 2		*42.21*	*5.11*		
Right Hand Grip Strength	*Group*		*Experimental*	*15*	*19.39*	*2.10*	*.723*	*.403*
			Control	*13*	*22.02*	*2.26*		
	Measurements		*Measurement 1*		*18.97*	*1.55*	*17.122*	*.000**
			Measurement 2		*22.44*	*1.64*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*17.63*	*2.12*	*.004*	*.949*
			Measurement 2		*21.15*	*2.23*		
		Control	*Measurement 1*		*20.31*	*2.28*		
			Measurement 2		*23.72*	*2.40*		

*p< .05

Table 5: Variance Analysis Results Regarding to Left Hand Grip Strength, Extended Arm Hang, 1 Mile Run/Walk

			Groups	***N***	***Mean***	***Sd***	***F***	***Sig.***
Left Hand Grip Strength	*Group*		*Experimental*	15	19.05	2.09	1.323	.261
			Control	13	22.58	2.24		
	Measurements		*Measurement 1*		*19.98*	*1.59*	*3.535*	*.071*
			Measurement 2		*21.64*	*1.59*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*17.94*	*2.17*	*.401*	*.532*
			Measurement 2		*20.15*	*2.17*		
		Control	*Measurement 1*		*22.03*	*2.33*		
			Measurement 2		*23.13*	*2.33*		
Extended Arm Hang	*Group*		*Experimental*	*15*	*18.73*	*4.71*	*1.678*	*.207*
			Control	*13*	*27.70*	*5.06*		
	Measurements		*Measurement 1*		*22.68*	*3.93*	*.393*	*.536*
			Measurement 2		*23.76*	*3.15*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*17.13*	*5.36*	*1.520*	*.229*
			Measurement 2		*20.34*	*4.30*		
		Control	*Measurement 1*		*28.23*	*5.76*		
			Measurement 2		*27.18*	*4.62*		
1 Mile Run/Walk	*Group*		*Experimental*	*15*	*14.64*	*.74*	*.591*	*.449*
			Control	*13*	*13.80*	*.79*		
	Measurements		*Measurement 1*		*14.45*	*.65*	*.957*	*.337*
			Measurement 2		*13.98*	*.53*		
	*Group*Measurement*	*Experimental*	*Measurement 1*		*15.51*	*.89*	*7.070*	*.013**
			Measurement 2		*13.76*	*.72*		
		Control	*Measurement 1*		*13.39*	*.96*		
			Measurement 2		*14.20*	*.77*		

*p< .05

4. Discussion & Conclusion

Researchers suggest that handicapped individuals participate in physical activities less [28, 29, 30] compared to their peers; and accordingly, it is observed that they display less cardiovascular endurance, body composition, muscle strength and higher BMI [31; 32, 33].

According to study results, it was determined that swimming exercises have protective effect on group and that it protects body weight level; after all, body weight has remarkably increased in the control group but there was no statistically significant difference between them. In study reported by Pommering *et al* [34] while there was no statistically significant difference in body weight parameters, Guidetti *et al.* [13] and Aksay [35] found significant difference in their studies. In conclusion of their studies, it was considered that swimming exercises program has no statistical effect on body weight levels, but in case exercises time and intensity are increased, it would have more effect on body weight. In terms of BMI, it was determined that swimming exercises has protective effect on group and helps to maintain the index level; after all, in the control group, BMI has increased remarkably but there was no statistically significant difference between them. This suggests that exercises have influence on the BMI parameter. In study reported by Hinckson & Curtis [19], while there was no difference in terms of BMI parameters; Wu *et al.* [36], and Aksay [35] reported significant difference in their researches. Finally, it was concluded that swimming exercise program has no statistically significant effect on the BMI levels. However, it would be more effective on the BMI level if exercise programs or active life profiles are organized. It was also determined that swimming exercises were effective on the study group and caused decrease on BFP levels; and that after all, BFP level of the control group has remarkably reduced but there was statistically significant difference between them. According to the findings in the literature, Boer *et al.* [37] and Cluphf [38] reported in their studies that there was statistically significant difference with BFP parameter; on the other hand, in studies of Pommering *et al.* [34], and Yanardağ *et al.* [39] no any significant difference was revealed. The finding of decreased BFP level in the control group in spite of the fact that exercise is effective on BFP would be result of current curriculum of students or their activity level in their social life, or of their dietary habits.

Based on the findings obtained within the scope off the present study, it was revealed that swimming exercises have positive effect on study group and swimming program contributed in flexibility level; on the other hand, flexibility increase in control group remained in the same level, but this difference between was not statistically significant. According to the literature findings, whereas Pommering *et al.* [34], Cluphf [38], Karinharju [40], Vliet *et al.* [33], Yanardağ *et al.* [39], and Aksay [35] revealed difference in regard to flexibility parameter; there was no any difference found in study reported by Carmeli *et al.* [41]. Finally, it was concluded that a swimming exercise program, which covers 12-week period, 3 days per week, and 1 hour per day, has no statistically significant effect on flexibility values. However, this situation can be assessed as normal for mentally handicapped individuals with movement restriction. Inclusion of further programs on flexibility in addition to the current exercise program or extending of exercise periods could contribute status of participants positively. It was determined that swimming exercise was effective on study group's vertical jump parameter and they result in increase on vertical jump levels. On the other hand, swimming exercise has the same increasing effect on control group; but there was no statistically significant difference between them. According to the findings reported by Giagazoglou [42], there was significant difference in terms of vertical jump parameter. Finally, 12-week (60 min/3 days/12 weeks) swimming exercises program has positive effect on vertical jump parameter. In the present study, although exercises have effect on isometric push-up parameter, a certain decrease was observed along the time in the control group. While there was difference found with isometric push-up parameters in studies reported by Haney *et al.* [43] and Hiraga *et al.* [44], no significant difference was reported by Savucu [45].

Additionally, although exercises have effect on modified curl-up parameter, no change was observed in the control group. Rintala & Antero [46], Calders *et al.* [47], Aksay [35] and Hiraga *et al.* [44] reported that there was significant difference in terms of modified curl-up parameter.

It was determined with regard to the swimming exercises group that exercises were effective on leg strength parameter and they cause increase on leg strength parameter. On the other hand, they cause an increase in the control group as well; but it was determined that there was no statistical difference between them. Rimmer *et al.* [48], Carmeli *et al.* [49], Savucu [45], Guidetti [13], Shields & Taylor [50], and Calders *et al.* [47] found significant differences in their studies with regard to leg strength parameter. Findings of these studies support our study. The increment observed in the control group would either be result of current curriculum of students or that they live an active life outside their school.

In terms of right and left hand grip strengths, swimming exercises are effective on study group; and they caused an increase. On the other hand, similar increment was observed on the control group; however there was no statistically significant difference determined between them. While Vliet *et al.* [33], Yanardag *et al.* [39], and Calders *et al.* [47] reported statistically significant difference in terms of grip strength parameter; Savucu [45], Shields & Taylor [50], and Vargas *et al.* [51] were able to find significant difference.

In the present research, it was revealed that exercises have positive effect on extended arm hang parameter; and that it causes increases. On the other hand, a decrease was observed in the control group along the time; however, there was no statistically significant relationship between them. While Smail [52], Vliet *et al.* [33], Yılmaz *et al.* [53], Guidetti *et al.* [13], and Golubovic *et al.* [54] found statistically significant difference in terms of extended arm hang parameter; Savucu [45] and Shields & Taylor [50] did not report such difference. According to these studies, it can be observed that exercise and training program activities applied to handicapped individuals have different effect on extended arm hang parameter at various levels. The present study determined that swimming exercises have positive effect on study group in terms of 1 mile run/walk parameter; and that it causes reduction in time spent to cross 1mile distance. On the other hand, it was determined that the time spent to cross 1 mile distance increased for the control group. In studies of Tomporowski & Jameson [55], Pommering *et al.* [34], Cluphf [38], Temple *et al.* [56], Rimmer *et al.* [48], Vliet *et al.* [33], Yilmaz *et al.* [53], Guidetti *et al.* [13], Calders *et al.* [47], Golubovic *et al.* [54], and Hinckson & Curtis [19], a statistically significant difference was found in terms of aerobic capacity parameter; however, Wu *et al.* [36] and Vargas *et al.* [51] reported in their studies that there was no significant difference. Based on these studies, it can be concluded that training and exercise programs applied to mentally handicapped individuals affect 1 mile run/walk parameter in positive way.

These low performance levels in tests are explained by sedentary life, less opportunity to participate in physical activity programs, physical characteristics, lack of coordination and skill, low motivation and distrust. Whereas benefits of physical fitness are universal for all children; handicapped children are in high risk group in terms of health because of their sedentary life style. The fact that mentally handicapped individuals have low motivation is perceived as primary cause for their low performance in fitness levels for both physical fitness tests and cardiovascular fitness. Ultimately, it is necessary to apply new training programs and to revise the current training programs designated for mentally handicapped individual. Regular training and exercise programs contribute in physical and motor developments of mentally handicapped individuals positively and allow developing their life qualities.

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