



The effectiveness of coordinated physical activity on decreasing attention deficit-hyperactivity disorder (ADHD) syndromes

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Abstract

The present survey attempts to investigate The effectiveness of syndrome coordinated physical activity on decreasing Attention deficit – hyperactivity disorder syndromes. Therefore, a sample of 50 people including two sub-groups were randomly selected, using cluster sampling method among students suffering from decreasing attention deficit in Tehran: an examining group including 25 people did a high activity ball games (soccer), and a control group including that had no physical activity. The required information were gathered by the means of SNAP-IV and CBCL questionnaires for students aged 6 to 18. In order to analyze the obtained information, in addition to descriptive statistics, we also used deductive statistics including the analysis of multiple variable covariance (MANCOVA), alongside examining the congruity of the presumed regression coefficients as well as examining the congruity of the presumed in-group variance, using Levin and Shapiro-Willek tests to study the normality of the distributed data. The results show that physical activities that have an aligned characteristics with the symptoms of the Attention deficit hyperactivity disorder, (high activity ball games), have a positive effect on categories of Hyperactivity and compound of the scale of SNAP and attention problems and ADHD problems of the scale of CBCL. Also, The results show that physical activities that have an aligned characteristics with the symptoms of the Attention deficit – hyperactivity disorder, (high activity ball games), have not a effect on categories of Attention deficit of the scale of SNAP.

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Introduction

Attention deficit – hyperactivity disorder (ADHD) is a developmental disorder in attention, impulsions control, and behavior guidance stemming from grave neurological, sensational, dynamic or emotional disorders (Harvey, Grizenko, 2007). This disorder makes significant problems over educational, cognitive, social, and emotional functions (Stephan, *et al*, 2009). Dynamic and balance skills which is a complex mental disorder in children suffering from this disorder, is highly lower than normal children (Killing, *et al*, 2008).

The diagnosis and treatment of this disease is of great importance due the high risk it might associate with crime, drug addiction, demeanor disorder, and oppositional behavior. As the medicinal treatment of this disease leads to temporary treatment of its symptoms (Solanto *et al.*, 2001) and long-term unsound usage of the drugs causes pertinence (Mool *et al.*, 2001), parents will be intensely in want of using non-medical treatments. Based on the findings by the researchers, there is a close relationship between physical activities and improving behavioral disorders. Dynamic exercising leads to the improvement of performative functions (Hillman, *et al*, 2008), cognitive, educational, and attention functions, as well as negative behaviors (Pantifex, 2011). One of the mechanisms that could be a justification for the improvement of cognitive function after doing physical activities is neurotropic or neurotic nutrition with elements such as development factor of insulin (IGF1) and the neurotropic factor derived from brain (BDNF) which leads to the production of vessels (production of new capillaries), neurogenesis (production of new neurons), cellular reproduction, and neurotic plasticity (Wenman and Gomez-Pinilia, 2005). Another possible mechanism might be the increase of brain blood flow that will lead to the cognitive functions due to physical activities (Corridor and Shill, 2007; Pearira *et al*, 2007).

Now, it is also necessary to point out whether physical activities that have an aligned characteristics with the symptoms of the disorder, i.e. those based on high endeavor and energy-consuming, can have an effect on this children.

therefore, investigate The effectiveness of syndrome coordinated physical activity on decreasing Attention deficit hyperactivity disorder syndromes and reaching its applicable results, can be useful in the process of decision making regarding the proper physical activity for the treatment of those suffering from the deficit. In fact, the present study is an attempt to examine this hypothesis that physical activities that have an aligned characteristics with the symptoms of the attention deficit hyperactivity disorder, can have a positive effect on this children.

Materials and methods

Participants

The statistical universe of this study includes all those students suffering from the decreasing attention deficit studying in the schools of Tehran in 2015-16 educational year. The sample of the study includes 50 people in two subgroups: an examining group including 25 people did a high activity ball games (soccer), and a control group including that had no physical activity. The sampling method in this survey is Random Multiple Cluster Sampling.

Research Tools

The required information were gathered by the means of SNAP-IV and CBCL questionnaires for students aged 6 to 18. SNAP-IV rating scale was first arranged by three scholars named James M. Swanson, Nolan, and Pelham in 1980 by rewriting the DCM criteria. The method of performing and marking points: this questionnaire includes 18 questions: the first 9 questions are for diagnosing the decreasing attention deficit (ADD) and the last 9 questions concern the diagnosis of hyperactivity disorder (HD). Hence, using this scale three types of diagnosis is possible: combinative, mainly due to decreasing deficit, and mainly due to hyperactivity disorder. The range of adjusting or answering is based on Likert scale from 0 to 3.

Validity and Reliability: criterion-related validity, 0/48 and according to the factor analysis, this test has 3 criteria that in general will appoint 0/56 of the variance. The validity of the content is also approved by the experts.

The Intra-class correlation coefficient equals 0/82, the Chronbach Alpha equals 0/90, and the split coefficient equals 0/76 (Sadr-Al-Sadat, Sayyed Jalal, *et al*, 2006).

The Child Behavior checklist (CBCL): the replier will fulfill the questionnaire according to the child's statue during last 6 months as 0= incorrect, 1= somehow or sometimes correct, and 2= completely or often correct (Achenbach and Reskurla, 2007).

The method of performing and marking points: Results in three areas of competence and functioning compromise scale, scale, scale based on experience, as well as collecting and scoring is based on DSM. Achenbach and Reskurla (2007) have reported the CBCL total coefficients credits using Cronbach's alpha of 97/0 and the test-retest reliability of 94/0. In the same year they have also suggested that based on the information and evidence presented in the context of content validity, criterion validity, and construct validity, we can conclude that emotional-behavioral problems are CBCL valid measure.

Data Collection Method

The experimental method is in the design of pre-test and post-test and random selection of subjects in the control group and test.

Statistical Method

In order to analyze the data, in addition to descriptive statistics, inferential statistics including multivariate analysis of covariance (MANCOVA), together with default test of the assumption of homogeneity of regression coefficients reviews,

default test of homogeneity of variances of the components of the default Shapiro-Wilk test and review Levine test for normal distribution of data was used.

Results

First, the default test of homogeneity of regression coefficients and the default test of homogeneity of variance within a group were done using Shapiro-Wilk test to check Levine and normal distribution of scores. Then, multivariate analysis of covariance (MANCOVA) (Table 1) along with multivariate covariance analysis tests (MANCOVA) were used.

Because the calculated value of F for the data of the Disorder (ADHD) is not significant at the 0.05 level interaction and pretest (0, 05 < P), so the assumption of homogeneity of regression slope is established, and as the correlation coefficients between the components of the disorder problems (ADHD) in pretest and posttest, are higher than 0, 6, so the multivariate analysis of covariance can be used to analyze data from the test.

As the amount of F Levin is not significant at the level of $\alpha = 0, 05$ ($0, 05 \leq P$), so the assumption of homogeneity of variance holds. Based on the Shapiro-Wilk test results, as they obtained values in a group at /05 are not significant, so the condition of equality of inner-group variances and normal distribution of data holds.

The results of the meaningfulness of the multivariate analysis of covariance (MANCOVA) test in the two groups showed that the meaningfulness levels of all tests allow the ability to test the use of multivariate analysis of covariance (MANCOVA).

Table 1. The results of the multivariate regression analysis on the effect of syndrome coordinated physical activity on decreasing Attention deficit - hyperactivity disorder syndromes.

Resources index changes		Sum of squares	Degrees of freedom	Mean Square	F	Meaningfulne ss level	ETA	
The effect of group	SNAP	Attention deficit	0.590	1 and 48	0.590	1.542	0.220	0.031
		Hyperactivity	2.105	1 and 48	2.105	8.272	0.006	0.147
		Compound	1.459	1 and 48	1.459	9.546	0.003	0.166
	CBCL	Attention problems	50.000	1 and 48	50.000	5.030	0.030	0.095
		ADHD problems	228.980	1 and 48	228.980	40.349	0.000	0.457

According to the data in Table 1, because the amount of F with degrees of freedom (1 and 48) in the categories of Hyperactivity and compound of the scale of SNAP and attention problems and ADHD problems of the scale of CBCL are meaningful at $05/0 = \alpha$. Comparison of the means between control and experimental groups at pre-test and post-test phase was indicative of disorders; Therefore, it can be concluded that physical activities that have an aligned characteristics with the symptoms of the Attention deficit - hyperactivity disorder, (high activity ball games), have a positive effect on categories of Hyperactivity and compound of the scale of SNAP and attention problems and ADHD problems of the scale of CBCL.

The ETA amount shows that the effect of physical activity is consistent with the symptoms of attention deficit/hyperactivity (ADHD) - (highly active ball games) -, on the symptoms of this disorder; in the sub-scale of the ADHD problem, 7/45 per cent, in the sub-scale of the attention problem is 5.9 percent, that has had the highest and the lowest impact. Therefore, the research hypothesis is confirmed with 95% of certainty.

Also, According to the data in Table 1, because the amount of F with degrees of freedom (1 and 48) in the categories of attention deficit of the scale of SNAP are not meaningful at $05/0 = \alpha$. Therefore, it can be concluded that physical activities that have an aligned characteristics with the symptoms of the Attention deficit – hyperactivity disorder, (high activity ball games), have not an effect on categories of Attention deficit of the scale of SNAP.

The comparison of the combined types of averages, based on a scale of SNAP and ADHD problems of CBCL test in the post-test and follow up stage between the two groups demonstrates the lasting reduction of symptoms. So, it can be concluded that the impact of physical activity consistent with the symptoms of attention deficit/hyperactivity (ADHD) - (highly active ball games) -, on the combined type of ADHD symptoms after a given time, has been steady.

Discussion and Conclusion

The purpose of the present study isto examine the effectiveness of syndrome coordinated physical activity on decreasing Attention deficit – hyperactivity disorder syndromes.

The results show that physical activities that have an aligned characteristics with the symptoms of the Attention deficit – hyperactivity disorder, (high activity ball games), have a positive effect on the tributary kind, Hyperactivity, and combinative kind of Attention deficit – hyperactivity disorder. Also, the results show that physical activities that have an aligned characteristics with the symptoms of the Attention deficit – hyperactivity disorder, (high activity ball games), have not an effect on the tributary kind, Attention deficit, of disorder.

Theories that explain attention/hyperactivity deficit as a motivational disorder, suggest that this disorder is associated with the inappropriate reaction towards reward or possible punishment. Damage to the ventral prefrontal cortex such as neural circuit, the amygdala and other limbic structures, lead to difficulty in learning from mistakes and monitor subtle changes in reward and possible punishment (Rolls, 2004 quoted from Barkley, 2015).

Dynamic exercising leads to the improvement of performative functions (Hillman, *et al*, 2008), cognitive, educational, and attention functions, as well as negative behaviors (Pantifex, 2011).

Physical activity can make opportunities to individuals to gain some achievements and this provides a chance for confidence incensement, depression and anxiety reduction (Kilok, *et al*, 2009). Physical activity improves these children's cognitive functions and behavior (Vert, 2012). Attention deficit-hyperactivity Cognitive Studies have shown that people with this disorder may be slower in responding than people without attention deficit-hyperactivity (e.g., Alderson, Rapport, and Kofler, 2007; Wilkat, *et al*, 2008, 2012, quoted by Barkley, 2015).

Buck and colleagues (2007) reported that physical fitness of children which is achieved as a consequence of the trainings, are associated with conservative parameters and the speed of response. Physical activity also causes the ACCRETION of deep rooted and vestibule senses and affect the high functions of the mind including attention, so that he spatial and temporal aspects of sensory input, processing, interpretation, relevant and integrated information and kernel selection, amplification, and control and compares the change in the form of a pattern of flexible and integrated well. One of the characteristics of physical activity consistent with attention deficit-hyperactivity (highly active ball games), is its being as a game. Research has shown that play therapy based on cognitive-behavioral approach affects the severity of symptoms of attention deficit and hyperactivity. Furthermore, play therapy increases the response time and decreases response errors (Naderi, Heidari, Bowen and Asghari, 2010; Jannatian *et al.*, 2008).

In explaining the results, it can be noted that the children, during growth, obtain their experiences in many ways, especially through the games. So, if we can enrich the environment and make the necessary infrastructure for group games and actions, it will probably help to improve the hyperactivity-impulsivity and growth of children (Shushtari *et al.*, 2011). Intense aerobic exercise can improve cognitive and educational functions of children with attention deficit-hyperactivity as temporary non-drug treatments (Pantylfeks, 2011). Weber *et al.* (2008) study also showed that heavy physical activity in children with attention deficit-hyperactivity, reduces restlessness and hyperactivity symptoms by about 95 percent. Study of cellular and molecular flow that occurs as a result of physical activity, puts forward several possible mechanisms that could be involved in the development of cognitive functions caused by physical exercises.

One of the mechanisms that could be a justification for the improvement of cognitive function after doing physical activities is neurotrophic or neurotic nutrition with elements such as development factor of insulin (IGF1) and the neurotrophic factor derived

from brain (BDNF) which leads to the production of vessels (production of new capillaries), neurogenesis (production of new neurons), cellular reproduction, and neurotic plasticity (Wenman and Gomez-Pinilia, 2005). One of the mechanisms that can be justified to improve cognitive function after exercise, is increasing cerebral blood flow in areas of dynamic control, balance, cardio-pulmonary, as well as areas of the hippocampus (Korydo and Shale, 2007, Perera, *et al.*, 2007).

Increasing cerebral blood flow has provided more fuel for neurological function and it eliminates metabolic wastes in these areas, thereby improves cognitive functions including attention. Physical activity can change the neuronal brain plasticity due to manufacturing processes, and protect the nerve to positively alter neural adaptations (Dyshmen *et al.*, 2006). A high level of physical fitness of children that is achieved following motion training, is associated with conservative parameters and speed of response (Bok *et al.*, 2007). Physical activity is also known as a stimulus for hypothalamic systems, mucous-adrenal, pituitary and noradrenergic (Best, 2010). Active participation in exercise can reduce depression and anxiety symptoms in children with attention deficit-hyperactivity disorder related (Kulak *et al.*, 2009). Exercise training will be also increasing the amount of neurotransmitters. This phenomenon promotes the accessibility of dopamine in the central nervous system.

Of other possible causes of attention deficit-hyperactivity disorder attention problems improve after aggressive participation in the energetic ball games, we can name encouragement to do team-work in groups, taking into consideration and the sense of acceptance in the group during the exercise sessions. The game will allow participants spend some of their energy in playing sessions. This energy expenditure causes reduction in impulsivity and hyperactivity of the participants in the remaining hours of the day. Finally, since the psychological and social research confirms the negative consequences of this disorder, it is hoped that with providing the right opportunities and guidance to children toward doing sport activities, in addition to the improvement of the disorder,

they also receive encouragement, approval and social acceptability. And also by raising the awareness of parents and explaining the relative benefits of physical activity than other therapeutic interventions, the opportunity to benefit from it can be provided.

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