Trends in Life Sciences
An International Peer-reviewed Journal
www.sciencejournal.in

EFFECTS OF JUMPING-ROPE TRAINING ON FINE MOTOR SKILLS

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ABSTRACT
The main aim of this research was to determine the effects of speed and demonstration Jumping-rope training program on fine motor skills of fourth grade elementary girl students. Investigating speed response, upper limb speed and dexterity, visual motor control sub-tests served as the other goal of this study. Study has been done in field- experimental method. The population includes all fourth grade students' elementary school girl students. 45 students selected by stratified random sampling as sample of this study and equally divided in two experimental (speedy and demonstration) and one control groups. The mean height and weight of subjects were 1.37 ± 0.07 meter and 33.40 ± 9.6 kg respectively. Findings showed that there are significant differences between fine motor skill and sub-tests of upper limb coordination in speed and demonstration groups. In other hand, based on findings of this study both jumping rope training program had significant effect on fine motor skills of participants. However, the results showed that no significant differences reported among the mean of response speed, visual motor control in three groups. Based on the results of this study, it is recommended that jumping-rope could be used as a suitable program for the development of fine motor skills of fourth grade elementary girl students.

KEY WORDS: dexterity, fine, Jumping-rope, motor, speed.

INTRODUCTION

Movement in children cause growth and evolution and is related to movement complications. By human evolution, develops his motor abilities. Movement is pleasurable for ant children and motor skills are an assurance for them. This role is critical in different aspects of growth like perception growth, sentimental growth and motor growth (Chu, 1996; Seraj *et al*, 2004; Behmard *et al*, 2012). In other hand, the role of physical education in schools lesson program help students to achieve required competency and does have regular physical activity in their life. The important part of comprehensive physical education program is educating basic motor skills. Today, it has been approved competency in basic motor skills is influential on different grounds. Without mastery in basic motor skills, there is little possibility for children to be successes in different motor skills in life (Kirchmer, 1992). Researchers and trainer believe the basic target of education and training is to help in grow and dehiscence of children's' talents. Developing different dimension of bodily growth, mental and psychological in children and youth is possible by physical activity. How to use body in different activity causes children learn to move and in movement, learning would be established (Moshrefjavadi, 2000). In order to grow perception-motor abilities in children, first experiment are very important. Although perception-motor abilities are generated of environment, heredity by different ratio. But one of important environmental factor in growing these capabilities is how passing first and sensitive period of life (Fallah, 1997). Principle skills are the bases of expert skills in sport and effectively influence on the progress of executing these skills in childhood (Hagger *et al*, 2002). Game and physical activity does have very sensitive and filtering role in promoting perception level and growth. When a child do an activity or behavior ,its pleasure, happiness and freshness leads to repeating activity and practice in motor and bodily action (Mofidi, 1997). Of perception-motor skills, we could name fine motor skills in which these movements has been done by great and small muscles and coordination of senses especially eye and hand (Kiamanesh, 1986). According to Nikozi *et al* view, having fine motor skills means doing movements in which it doing requires using groups of small muscles. Whereas we see in talking phenomenon and getting objects and applying them (Alipour, 1999).

Fine motor skills include pattern in which for doing correctly require balance in different systems like sensation- bodily and nerve-muscle and skeletal-muscle and visual one, but in correct application of sensation- bodily system is possible without feedback from visual one (Casesmith, 2004; Suba, 2006). These skills does have more vulnerable nature than gross motor skills because of different factors like allocating most part of marrow motor layer and using different groups of fine muscles (Suba, 2006, Kramer and Hinojosa, 2001). In the childhood period, motor skills related to using hands and feet grow rapidly. But fine motor skills like fingers ability and coordinated movement of eyes and hands does not grow enough yet. In school period, skills pattern of fine motor substitute generally in children and children could participate in sports like running, jumping, and shooting. Many of these skills are the result of combining hands

movement to eye and feet (Soltani, 1999). Like demonstration skills in rope jumping in which eye coordination would combine to hand rope jumping move and feet substitution. Fine Motor skills include jumping up the rope, getting ball and shooting ball and are related to fine muscles. But fine motor coordination is related to grow and evolution of hands' small muscles (Werner and Reiny, 2000). Super (1949), Desrosiers *et al* (1994), Arnould and Pentam (2006), has distinguished toes fine skills from hand gross skills. Toes fine skills include coordination in hand corpus move and toes and hand gross skills including coordination in hand and arms movement. Skills require coordination of eye and hands are of juggling skills (Sanatkaran and Namazizade, 1998). Melby (1936),Wilber (1966), Rozen (2006) study's showed jumping practice executing by rope is one valuable activity in which leads to muscles power progress, body resistance, heart health and blood vessels dependent to it, balance and body equilibrium, agility and coordination among body's elements. Body good control are of situation, balance and body equilibrium in under part and the end jumping to rope and bodily fitness , skills and innovation power and creativity are the possible result of this activity and movement (Wibler, 1966). Rapidity and hand and feet speed are of the two sports characteristic in which are influential on mastery in more sports competition. Rope jumping is one practice instrument in which does not require so many practicing meetings in a week and increases speed and rapidity (Lee, 2010).

Speedy practice program strengthens upper part of body muscles and lower part one. In general, in a 4-6 week period after regular speedy practice in athlete's strengthen corpus and forearm outstandingly and power increases sensibly. The ability of leg back muscle and four heads of leg would develop too. Shoulder muscle and back would develop and improves maintaining body balance (Lee, 2010). In speedy Jumping-rope, student or athlete begins to jumping-rope as game jugging in a 30 seconds by trainer order. Counting would begin by passing rope under right feet (Sadatrezaei, 2005).

There are so many skills in demonstration parts in which has been operated by one, two and multi persons by short and tall rope and by two and multi ropes (Roohi *et al*, 2010). Educational program has been approved in national design of rope jumping and has been executed in country a school includes 10 skills suggested by rope jumping association (Guidance of Jumping-rope project, 2010; Sadatrezaei, 2005). Among these skills 4skills include: heel and paw, cradle, running on feet (tall knee) hands cross are on fine skills. Jumping-Rope improves nerve and muscle coordination, increases agility, improves movement rhythm, increases action and interaction speed and develop body ability (Roohi *et al*, 2010). studies has been done in inner and out of country in general has emphasized on rope jumping on motor skills. (Makainny, 2010; Chao and Shih, 2010; Nickelson, 2005; Ozer *et al*, 2011). an now, for the first time we compare the influence of speedy practice and demonstration on fine skills. Shroj (2002), Shroj *et al* (2006), Gholammi *et al* (2013), Aldmier *et al* (2013), believes there is positive relation among balance and agility and by progress in one, the other progress, too. Balance and agility grows by children involvement to environment and experiencing it. Balance and agility in game form as a pleasurable activity for a child is a way of involving him to the one is not game. Saraco (2000) does not found meaningful difference in the two groups of girls passing preschool period and not passing this stage in executing some games. Butcher and Eaton (2001) in a study on the amount of affectivity of fine motor skills and gross in preschool children in free movement ground has found better affectivity in gross and fine motor skills does depend on the amount of using and applying muscles during daily activities and early stimulating children leads to progress in motor skills.

The result of Emarati *et al* (2010) study showed selected elementary school games does have meaningful influence on speed, upper part of body's coordination, upper part of body agility and perception-motor skills grow in testis than general activities. But its influence is not meaningful on stable and seeking balance, two sided coordination, power, response speed, visual-motor control and social growth of testis. According to motioned above and the result of research, it require examining Tanavarz National Project of jumping-rope on fine motor skills in girl students in fourth grade of elementary school and we should examine the influence of jumping-rope practice on students perception-motor skills? Does speedy rope jumping skills does influence on students' fine motor skills? Does demonstration jumping-rope education have influence on girl students dine motor skills?

MATERIALS AND METHODS

According to the topic, this study is of field-experimental type. Statistical population includes girl students in fourth grade in the years of 2013-2014 in which are educating in 121 elementary schools. Among these schools we have selected randomly in first stage 3 schools and in the next stage from any school we have selected one class and in any class about 15 students randomly in which has been divided equally in three groups of control (n=15), speedy (n=15), demonstration (n=15), then this research statistical sample includes 45 students. We have used of Bruininks-Oseretsky Test of Motor Proficiency in fine motor skills by four sub-tests of response speed, visual-motor control, speed and

agility in upper part of body in subjects. Subjects in the two groups of demonstration and speedy has done jumping-rope training for 6 weeks and in any week in 2 sessions and about 40 minutes. In any session for about 10 minutes, they have has warming movement including tension, oscillation, jumping based on student age. This group has done 10 minutes to class activity and 20 minutes jumping-rope program as the project of jumping-rope method. Research hypothesis has been analyzed by inferential statistic of one way variance and post-hoc Tukey test and used of SPSS22 software in analyzing datum.

RESULTS

The mean height and weight of subjects were 1.37 ± 0.07 meter and 33.40 ± 9.6 kg respectively.

Table1. The result of ANOVA for speed response

variable	Source of variation	SS	df	MS	F	P
Response speed	Between groups	2.80	2	1.40	1.08	0.349
	within groups	54.4	42	1.29		
	Total	57.2	44			

The result of one way of analysis variance in table 1 shows there is no meaningful difference among the mean speed response in girl students in speed, demonstration and control jumping-rope groups.

Table2: The result of Kruskal–Wallis test for sub test of visual motor control & upper limb speed and dexterity

Variable	X^2	df	Sig.
Motor-visual control	5.30	2	0.070
upper limb speed and dexterity	17.22	2	0.001

The result of Kruskal–Wallis test in table 2 shows there is no meaningful relation among the mean growth of visual-motor control in students on speedy, demonstration and control jumping-rope groups (p=0.070, x2=5.30). But there is meaningful difference among the mean of upper limb speed and dexterity in students on speedy jumping-rope, demonstration and control groups (x2=17.22, p=0.001). Therefore, we have used of pair comparison and adjustment test for determining the difference resource and testing sub hypothesis.

Table3: The result of pair comparison in sub- test of upper limb speed and dexterity

groups	Statistic test	Sig	Adj.sig
speedy-control	-16.56	0.001	0.001
demonstration -control	-17.53	0.001	0.001
speedy-control	-0.967	1.00	1.00

The result of pair comparison result in table 3 showed there is meaningful difference among the mean growth in upper limb speed and dexterity in students in speedy jumping-rope group (3.93), and control (0.66). There is meaningful difference among the mean growth upper limb speed and dexterity in students in demonstration jumping-rope group (3.93), and control (0.66). In other words, demonstration jumping-rope and speedy improves meaningfully the upper limb speed and dexterity in students. But there is no meaningful difference among the mean growth of upper limb speed and dexterity in speedy and demonstration jumping-rope groups.

Table4: The result of one way analysis variance for fine motor skills

Variable	Source of variation	SS	df	MS	F	P
Fine motor skills	Between groups	104.57	2	52.28	8.38	**0.001**
	Within groups	262.0	42	6.23		
	Total	366.57	44			

The result of one way analysis of variance in table 4 shows there is meaningful difference among students fine motor skills in demonstration jumping-rope group, speedy and control (P=0.001 F(42,2)=8.38). Therefore, we have used of post-hoc Tukey test in order to determine the difference resource and test of sub hypothesis

Table5. The result of post-hoc Tukey test for fine motor skills

groups		sig
Speedy jumping-rope	Control	0.003
	Demonstration jumping-rope	0.997
Demonstration jumping-rope	Control	0.002
	Speedy jumping-rope	0.997

The result of post-hoc Tukey test in table 5 showed there is meaningful difference among the mean growth of fine motor skills of students in speedy jumping-rope group (5.86), and control (2.66). Also, there is meaningful difference among the mean growth of fine motor skills in students in demonstration jumping-rope group (5.93), and control (2.66). In other words, speedy jumping-rope and demonstration improves the growth of fine motor skills in students meaningfully. But, there is no meaningful difference among the mean growth of children fine motor skills in demonstration and speedy jumping-rope groups.

DISCUSSION

The result of examining first hypothesis based on difference among the mean of speed response in girl students in speedy, demonstration and control jumping-rope groups showed there is no significance difference among the mean growth of speed response in speedy, demonstration and control groups. Recent results are the concurrent as Heidari *et al* (1999), Eskandari (1997), Paik *et al* (2006). The cause of similarity is existing codified program like rhythmic movement, gymnastic, and selected school games and the influence of rejecting these periods on the fine motor in children. But, is not the same as Emarati *et al* (2011), it is related to the practice content and expertise of practice. Because of growing this aspect of perceptual- motor growth in children, we should practice them especially and feasible motor program by emphasis on programming. As we mentioned before, different practice program does have different effects on sub structure motor abilities.

In recent study, student has received about 6 weeks and in any weeks 2 sessions and about 40 minutes, the program of rope jumping. Because, student participating in rope jumping program does have outstanding progress in perceptual-motor skills, we could indicate it is against boast theory in which growth procedure would be controlled through internal factors (genetic) and no external (environmental) one. And environmental factors influence on growth amount temporarily and at last heredity factors control growth (Haywood, 1993). The result of second hypothesis showed there is no meaningful difference among the mean growth of visual motor control of girl's students in speedy, demonstration and control groups. Recent study result is the same as Emarati *et al* (2011) after examining the mean of the two groups; we observe progress in the two. But it is not meaningful from static view. It is not the same as Eskandari (2006), Wassenberg *et al* (2004) perhaps the type of selected motor program has influenced on visual-motor control factor and coordination of eye and hand ion testis. It is related to different influence of different motor programs on perception-motor skills elements. The result of third hypothesis shows there is meaningful difference among the mean of upper limb speed and dexterity in girl students in speedy, demonstration and control groups ($p \leq 0.05$). Recent study result is the same as researchers like Emarati et al (2011), Heidari *et al* (2009), Eskandari (2007), khalji and Emad (2002), Paik *et al* (2006), Goodway and Branta (2003), Makenzi *et al* (1998).

Its cause is the influence of sub structural factors forming rope jumping program, because we see demonstration jumping-rope factor and speedy by different speed and different aspects in the games and the ability to change rapidly in all parts of body. Jumping-rope program improves student's coordination and it requires preparing physical education facilities by experts to develop student coordination by doing practices. The result of examining fourth hypothesis showed there is significant difference among the mean growth of fine motor skills of girl's student in speedy, demonstration, control groups. In other words, demonstration jumping-rope and speedy improves meaningfully fine motor skills in students.

In other words, demonstration and speedy jumping-rope leads to meaningful improvement in fine motor skills in children. Recent study result is the same as researchers result like Ghasemi *et al* (2012), Emarati *et al* (2011), Heidari *et al* (2009), Vesalinaseh (2009), Eskandari (2007), Sheikh et al (2003), Khalij et al (2002), Paik et al (2006), Good

way and Branta (2003) McKenzie *et al* (1998). Also, there is no meaningful difference among influence of speedy and demonstration jumping-rope on the growth of gross motor skills in children.
According to researcher view and research result, we indicate jumping-rope program by its variability could influence on under structural factors of different dimension of motor-perceptual proficiency especially fine motor skills and if be practiced correctly would have outstanding role in improve and development of speed response, upper limb speed and dexterity and in general on fine motor of students.

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