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Description of Gross and Fine Motor Skills for 9 and 10 Years Old Children of Golestan Province and Comparison to Each Other

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Abstract: The aim of this study was description of gross and fine motor skills for 9 and 10 years old children of Golestan province and comparison to each other. For doing so 700 male and female students from third and fourth grade of elementary schools of selected states of Golestan province were chosen randomly. Measurement tool of this study was Bruininks-Oseretsky test of motor proficiency. 5 groups of trained testers were responsible for performing tests and recording information. Raw scores of tests were recorded and after turning into standard T scores were categorized according to age and sex and then compared. Descriptive statistics methods and deductive statistics tests of independence t and variance analysis were used for comparing groups according to sex and age. Results indicated that boys were better in gross motor skills and girls were better in fine motor skills. 10 years old students were significantly better than 9 years old students in gross motor skills but there was no significant difference between 9 and 10 years old students in fine motor skills and, there was no significant difference between girls and boys in motor efficiency but 10-year-old students were higher than 9-year-old students in motor efficiency ($p<0/05$)

Key words: Gross motor skills · Fine motor skills · Elementary schools · Motor efficiency

INTRODUCTION

During early childhood, children experience a variety of motor activities and recognize different aspects of their environments through these experiences. They gradually develop their inherent capabilities and finally during elementary school noticeable changes occur in their movements. Movements are not as simple as in the past anymore and they have become somewhat more complex [1]. Understanding develops and motor patterns become automatic. Childhood, adolescence and adulthood are like contiguous chains and each of them plays an important role in development of talents, but childhood is the most important of them. It is obvious that if the child doesn't develop naturally, all stages of his life will be affected. Studies of children's motor development, because of its special nature, indicates that motor function during these years is most affected by genetic, age, anthropometry features, cognitional abilities and environmental, cultural and social factors [2].

Researchers of motor development who are interested in studying motor and developmental procedures focus on gross and fine motor skills. In actual fact one of the things that motor developmental professionals consider for measuring quality and quantity of motor development is amount and manner of fine and gross motor skills development [3]. Fine motor developments are little movements that give the ability of tasks such as writing and manipulating little objects. These skills require function of little muscles of fingers, Hand and wrist. Gross motor skills are big movements that use bigger muscles in arm; foot and trunk include running and jumping. Studies indicate that changeability in this kind of skills allows having more complete picture of individual differences. Along with children development, developmental differences and problems become more apparent. So evaluation of children's motor skills is very important thus their differences from standard criteria and current norms become characterized [4,5]. Gallahue and Ozmun mentioned that before maturity ages, males and females are in similar statues of physical complex, power and length of limbs [6]. However studies have indicated that there is significant difference between males and females in performing gross and fine motor skills [7]. Researchers have evaluated gross and fine motor skills in different ages. Linden reported significant differences in age not is

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sex of 15- and 18-year-old males and females in performing gross and fine motor skills such as creeping and coordination of pen and paper for painting [8]. Thomas and French in analysis of 64 researches about motor abilities find out that males are better than females in gross motor tasks such as jumping and running and females are significantly better than males in fine motor tasks such as visuomotor coordination and flexibility [9]. Peak *et al.,* considered differences between males and females in fine and gross motor skills and their relationship with self-perception in children and teenagers. They reported that males have better performance in gross motor skills and females are better in fine motor skills. Also children, who had higher scores of self-perception, had better performance in fine and gross motor skills [10].

Despite general and common principle, quality of development is not similar in all people. Recognition and evaluation of motor abilities and awareness of individual differences allows professionals to find out developmental problems and disabilities and provide solutions for enhancing qualitative and quantitative level of children development. Most of physical and motor ability evaluations of Iranian children indicate their weakness compared to standard norms. Reason of this matter might be investigated in cultural, social and financial status of families, education level of parents, number of family members, genetic and physical environment of children life. Musavi *et al.* [11] measured physical development and motor development of 1200 middle school students by anthropometric measurements and Bruininks- Osretsky test of motor proficiency. Results of this study showed that motor abilities of most Iranian children were in an average level. Males were better in gross motor abilities and females were better in fine motor abilities.

Measurement of motor development for various ages and races is considerable. These considerations show cultural and racial differences in addition to age differences. Researches about motor development of children is not rich in history and researches on bigger universe of children and bigger geographic area seems necessary. Because of this necessity current research considers gross and fine motor skills for 9 and 10 years old children of Golestan province. This province is in a good condition with regard to number of cities and also existence of various races and groups and it seems that results of this research would indicate motor status of 9 and 10 female and male children of Iran.

MATERIALS AND METHODS

Research Methodology: Method of current research is descriptive-comparative which has been done as a field study.

Statistical Universe and Sample: Statistical universe of current research is all female and male students of third and fourth grade of elementary schools of selected countries of Golestan province in school-year 1378-88. The total number of them was 32756. 700 of them were chosen according to Morgan sampling chart through multilevel random-cluster sampling. It should be mentioned that Morgan sampling chart has proposed 379 for a universe with 30000 individuals and 380 for a universe with 40000 individuals. Here for more accurate findings, sample size was doubled and finally 700 individuals were chosen. Children who were in third and fourth grade but were younger than 9 years old and older than 10 years old were excluded from statistical sample [11].

Measurement Tools: In this research for considering gross and fine motor skills of children Bruininks- Osretsky test of motor proficiency was used. This test measures gross and fine motor skills of children in the range of 4/5 and 14/5 years old and is organized in 8 subtests with 46 elements. 4 subtests measures gross motor skills, 3 subtests measures fine motor skills and one subtest measures both of them. Reliability and validity of this test is considered by Musavi *et al.*[11]in Iran and its validity coefficient is 0/78.

Method of Performance: At first height and weight of testers was measured and recorded by weighing machine and tape measure. All steps of tests were conducted in school environment and in educational hours. Tester started with explaining method of conducting items for students. Then students performed tests and scores were recorded according to manual of test. After performing the test, for each student one score for each subtest, one score for the sum of 1 to 4 subtests and one score for 6 to 8 subtests was recorded.

Statistical Methods: In this research descriptive statics was used for analysis of data and t-student statistic test, two way variance analyses and Tokey test were used. All statistical operations were performed by SPSS 13/0 software.

RESULTS AND DISCUSSION

Describing of Students' General Characteristics: Students of this research were 700 of 9 and 10 years old male and female students in fourth and fifth grade of elementary schools in Golestan province. Results of descriptive tests indicates that mean of males height was a little higher than females and mean of females weight was a little higher than males and mean of height and weight of 10 year old students was a little higher than mean of height and weight of 9 year old students. Also most of students had right hand and food domination (Tables 1 and 2).

Subtests: comparison of mean of standard scores of gross and fine motor skills according to sex indicated that gross motor skills of males is significantly better than females and standard scores of females was higher than males.($p<0/05$) (Table 3). Also statistical comparison of means of standard scores of gross and fine motor skills of students according to age indicates that standard scores of gross motor skills of ten year old students was significantly higher than 9 year old students but there was no significant difference between two groups ($p>0/05$) (Table 4).

In running speed and dexterity skill, F for factor A (sex) was 10/448 and for factor B (age) was 58/496. These numbers indicates dominant of males to females and 10 year old students to 9 year old students. F counteraction of A and B factors was 1/124 ($p<0/05$) which indicates no significant affect in running speed and dexterity of students. ($p<0/05$) results of variance analysis test shows that females and 9 year old students are better in balance. ($p<0/05$) counteraction of A and B had no significant

Table 1: Indicators of descriptive statistics of height and weight of students

		female				male			
	age	mean	Standard deviation	min	max	mean	Standard deviation	min	max
Height (cm)	9-year-old	138/41	6/57	133	156	140/99	4/73	137	148
	10-year-old	146/08	6/82	135	163	146/64	6/59	130	155
Weight (kg)	9-year-old	32/79	9/48	25	58	29/13	3/54	25	34
	10-year-old	36/84	5/05	30	45	38/41	7/57	30	50

Table 2: Frequency and percent of dominant hand and foot of students

			Dominant hand			Dominant foot		
	Age		right	left	mixed	right	left	mixed
Female	9-year-old	Frequency	80	10	0	79	7	4
		Percent	88/9	11/1	0	87/8	7/8	4/4
	10-year-old	Frequency	76	14	0	81	9	0
		Percent	84/4	1/6	0	90	10	0
male	9-year-old	Frequency	80	10	0	77	7	6
		Percent	88/9	11/1	0	85/6	7/8	6/7
	10-year-old	Frequency	81	9	0	79	11	0
		Percent	90	10	0	87/8	12/2	0

Table 3: Comparison of males and females in gross and fine motor skills

	female		Male			
	mean	Standard deviation	mean	Standard deviation	T	sig
Gross motor skills	41/27	12/44	63/61	12/63	6/1	0/000
Fine motor skills	55/06	12/73	46/69	7/82	8/72	0/000
Motor efficiency	103/75	10/19	108/49	1/44	0/61	0/341

Table 4: Comparison of males and females in gross and fine motor skills

	9-year-old		10-year-old			
	mean	Standard deviation	mean	Standard deviation	T	sig
Gross motor skills	43/49	7/40	56/93	11/53	4/6	0/000
Fine motor skills	48/64	9/81	49/06	8/40	1/755	0/08
Motor efficiency	92/53	11/51	105/96	16/40	4/951	0/002

effect on balance of students. (F=1/015) in bilateral coordination main effect of sex was significant but main effect of age and counteraction wasn't significant. In this skill males were dominant. In power skill, F for factor A (sex) was 33/615 and for factor B (age) was 29/846. These numbers indicates dominant of males to females and 10 year old students to 9 year old students. Counteraction F of A and B is 1/41 which indicates no significant effect in power of students. In upper limbs coordination, F for factor A (sex) is 1/581 and for factor B (age) is 74/713. (p<0/05) these numbers indicates no significant difference between males and females and dominance of 10 year old children to 9 year old children. F counteraction of A and B is 11/039 which indicates no significant effect in upper limb coordination of students. In speed of reaction skill there was no significant difference between either of factors A (sex) and B (age) and counter action. In visuomotor control main effect of sex was significant but main effect of age and counteraction wasn't significant. In this skill females were better. In speed and dexterity of upper limb, F for factor A was 92/514 and for factor B was 83/746. These numbers indicates dominant of females to males and 10 year old students to 9 year old students. F counteraction of A and B is 7/146. (P<0/05) which indicates significant effect of counteraction on speed and dexterity of upper limb of students. In gross motor skills main effect of sex and age was significant but counteraction of sex and age had no significant effect on gross motor skills. (P<0/05) males and 10 year old children were better in gross motor skills. In fine motor skills main effect of sex was significant but main effect of age and counteraction of age and sex wasn't significant. Girls were better in fine motor skills. Totally by calculation of final score of motor efficiency test and comparison of males and females and also 9 and 10 year old children it become apparent that there is no significant difference between males and females but there is significant difference between 9- and 10-year-old children and 10-year-old children were higher.

DISCUSSION

Gross and fine motor skills are important factors of motor development and foundation of learning and development of sport skills. So evaluation of them in different ages and different developmental levels is very important. Although children in natural development process reach significant levels of perceptual-motor skills, in existence of any delay or disorder, performing fundamental actions for changing and improving of motor development of children seems necessary [1]. Recognition of possible problems and effort for solving them has a significant necessity. Current study titled Description of gross and fine motor skills for 9 and 10 years old children of Golestan province and comparison to each other was conducted to provide a complete profile of motor characteristics of these children. Consideration of motor development status of elementary students and interpretation of data resulting from Bruininks-Oseretsky test according to standard scores was done. According to Bruininks criteria for estimation of level of each subtest with regard to standard scores of test it was determined that 9-year-old females were average unless running speed and dexterity which was lower than average. 10years old females were average in all subtests. 9 and 10years old male students were average in all subtests unless running speed and dexterity and upper limb coordination which was upper than average. Whit regard to sex, female students were in average level in all subtests unless speed and dexterity of upper limb which was higher than average and male students were average in all subtests unless speed of running and dexterity and coordination of upper limb which was upper than average.

In considering results of motor performance of children in lower ages usually dominance of males over females in gross motor skills and dominance of females over males in fine motor skills is obvious. Females usually because of lower secretion of androgen and cultural and social restrictions are less encouraged for physical activities and have fewer opportunities for engaging in such activities. It is obvious that because of overlapping of this two, we did not observe significant differences in motor performance between males and females. Results of this study about dominance of males over females in gross motor skills and dominance of females over males in fine motor skills are consistent with all previous studies [4,5, 8,9].

Comparison of standard scores of running speed and dexterity of students, with regard to sex and age, indicated that speed of males was very better than females and speed of 10 year old students was better than 9 year old students. Findings of this part of the research are consistent with results of Kordi and Linden *et al.* [3, 8]. Males have higher speed than females in all ages. The most important reasons of this difference are higher lower limbs of males in proportion to total of height and low motivation of females for engaging in powerful activities because of cultural issues. Speed of running increases linearly in males during 5 to 17 year old. Some males have a little decrease in 12 and 13 year old which refers to adolescent awkwardness. Adolescence awkwardness is a

temporary decrease in motor function during adolescence. This functional decrease influences speed and also affects power, balance and other motor function components. Some researchers believe that this phenomenon is just for males and is not general in them. Adolescence awkwardness during maturation is probable because of lack of time consistent of growth of bones, muscles, tendons and joints. In contrast speed of running increases in females in 12 years old and after that shows little changes until 17 years old. Comparison of standard scores of balance indicated that female students were significantly better than males. 9 year old female students had better performance than other groups in balance. Findings of this part of the study are consistent with results of previous studies [6, 12], but are different from other results [9,11]. They find better performance of males than females in balance. Weakness of males, in balance, is probably because of longer lower limbs in proportion to total of height and disproportionate of length of limb during adolescence. However, further study is required.

Comparison of standard scores of power showed that males were better than females and 10-year-old students were better than 9-year-old students. 10-year-old male students were better than all other groups. Dominance of muscle power of males over females in this research is consistent with results of some other researches [6,11,13]. Male's power increases linearly along with development until 13 and 14 years old but it increases faster in 16 and 17 years old. Development of power of females along with age continues until 16 year old but is different from peer males. Although sexual differences of power are not significant in childhood, it always exists. Noticeable acceleration and development of power during adolescence in males makes sexual differences more apparent. Its reason is hormonal changes in males during adolescence and different growth of muscle bulk. Also, neuromuscular adaptations resulting from exercise and experiment without considering muscle bulk is effective. Cultural norms of society usually do not encourage females for powerful activities and sometimes they are even prohibited. So they have little experimentation and motivation for such kind of activities. In contrast traditional activities of males usually cause more experimentation of them in performing powerful tasks and development of their power. Dominance of males in bilateral coordination and dominance of females in visuomotor control and speed and dexterity of upper limbs is consistent with results of previous studies [9,11, 14] as they observed that females are better than males in fine motor skills that require eye-hand coordination.

Results of soft charts and special standard measures of test indicate that 9 and 10 years old students of Golestan provision are not as good a motor status. Especially, females are in a very bad condition in gross motor skills and require special attention. There are two hypotheses about motor development of individuals. First hypothesis, called developmental delay hypothesis, notes that these individuals without any special problem just have developmental delay. In other words, their developmental process is similar to others but it occurs more slowly. Second hypothesis is called developmental metamorphosis hypothesis and notes that children are in fact cognitional or motor handicaped which influences their developmental pattern. Among the most common problems in this context we can mention are developmental coordination disorder (DCD) and hyperactivity-attention deficits (ADHD) [1]. However, teachers and physical trainers should recognize individuals with motor problems and pay special attention to them and if necessary, refer them to professionals. Fortunately, all researchers have verified desired effects of motor activities and exercises on development of perceptual-motor abilities or at least there are no negative effects. So, minimum benefit of engaging children in exercise is keeping healthy and preventing motor problems. In addition, an undeniable role of motor activities as a therapeutic tool should be noted. Individuals who gain standard scores of upper category of society are more likely to engage in professional sports. Introducing these children to sport gyms for enterprise in professional exercise seems effective. However, screening individuals for entry to a special athletic field in societies such as in Iran with various geographic, racial and cultural groups, seems necessary. It should be mentioned that recognizing athletic talents is a multidimensional issue and for desired results all aspects of them and relations of these aspects with each other should be considered.

REFERENCES

1. Robert, M.M. and C. Boochard, 981. growth, maturity and physical activity. Omide danesh press, first edition, Tehran.
2. Shojaee, M., 1985. Motor development. Emam Hosein University Publication, second edition, Tehran.
3. Kordi, M.R., 1969. consideration and comparison of perceprual-motor skills of 9 and 10 years old students of north and south of Tehran and comparison of them with American children. M.Sc. Thesis, Tehran university.

4. Rosenblum, S. and N. Josman, 2003. The relationship between postural control and fine manual dexterity. Physical and occupational therapy in pediatric, 28: 219-234
5. Mr Beliani, M.A., 1977. Effect of selective physical activities on perceptual-motor abilities of first grade of elementary male students of territory 6 of Tehran. M.Sc. Thesis, Tehran University.
6. Gallahue, D.L. and J.C. Ozmunm, 2002. Understanding motor development: infants, children, adolescents and adults. McGraw Hill, 5th edition, New York.
7. Jafari, G., 1976. Consideration of relation between social and financial status of families and motor skills of third grade of elementary male students of Khoaf. M.Sc. Thesis, Tehran university.
8. Linden, A., K. Boschian and C. Eker, 2004. Assessment of motor and process skills reflects brain-injured patients' ability to resume independent living better than neuropsychological tests. Acta neural, 111: 48-53.
9. Thomas, J.R. and K.F. French, 1985. Gender across age in motor performance: a Meta analysis. Psychological Bulletin, 98: 260-282.
10. Peak, J.P., 2007. The role of early fine and gross motor development on later motor and cognitive ability. Human movement science, 27: 688-681.
11. Mousavi, V., M. Kazem and S. Masume, 1983. Description of motor and physical characteristics of middle school students of Tehran in school year, 19: 82-83. Research plan for Tehran University.
12. William, C.T., 1998. Structural models of cognitive and perceptual motor abilities. Personality and individual differences, 24: 603-614.
13. Blanche, K. and M. Isaac, 1973. Perceptual-motor development of first graders as related to class, race, intelligence visual discrimination and motivation. J. School Psychol., 11: 47-56.
14. Hassan, M.M., 2001. Validity and reliability for the Bruininks-Oseretsky test of motor proficiency- short form as applied in the United Arab Emirates culture. Perceptual motor and motor skills, 77: 535-544.