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Relationship between somatotype and some of musculoskeletal deformities of girl students with down syndrome

Lida Dehghani[1], Masoumeh Hashemi[2], Reza Saboonchi[3], Ahmad Hematfar[3], Alireza Roonasi[3]

[1]*Department of Physical Education, Hamedan Education*
[2]*Department of Physical Education, Hamadan branch, Islamic Azad University, Hamadan, Iran*
[3]*Department of Physical Education, Bourojerd branch, Islamic Azad University, Bourojerd, Iran*

ABSTRACT

This study focused on evaluation relationship between somatotype and musculoskeletal deformities of girl student with Down Syndromes in Tehran. 30 girl students with Down syndrome, were selected randomly. Spinal column deformities were measured by New York test, posture screening and lower limb deformities were measured by means of related tests. Somatotype was measured by Heath-Carter method. Measured variables included: height, weight, four skinfolds, two girth (upper arm and calf), two breadths (humerus and femur). Relationship between some of deformities with somatotype were analyzed by chi-Square test. The high magnitude of BMI and HWR were observed (30.76, 36.14). The distribution of Somatotype of subjects was Endomorph, Ectomorph and Mesomorph. Results of chi-Square test showed that there was not significant relationship between somatotype and deformities (Neck Lordosis, Torticollis, Uneven Shoulders, Scolisis, Kyphosis, Back Knee, Flat foot, Hallux valgus). While there was a significant relationship between Endomorph and Mesomorph with Lordosis, forward abdomen, Genu Varum, Genu Valgum. Somatotype in person with Down syndrome was mostly endomorph and prevalence of musculoskeletal deformities among them was high Flat foot, forward abdomen and Lumbar Lordosis.

Key word: Somatotype, musculoskeletal deformities, Down syndrome

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INTRODUCTION

Everyone is affected by three elements: genetic (inheritance), environment, special personal characteristics and personality. Among mentioned elements, the inheritance can be as the most important in creating the weakness and disorder in movement development. This disorder and weakness can result in body and physical disorders. Therefore this person will lost his/her favorite and suitable position and condition. These defects by themselves, bring in themselves weaknesses in vital systems such as circulation and respiratory systems. Nowadays, in all human societies, exceptional children and especially mental retarded children were taken under special consideration. Among these mental retarded children, patients with Down syndrome or Trisomy 21 are more important because this disorder is most prevalent maternal defect with almost the same probability and distribution and frequency in all countries, nations and people `s social levels These patients have potential talents although less than normal children [25]. In according to having higher age up to 58 years old in patients with Down syndrome and its high prevalence rate (one person of 600 to 1000 cases related to alive neonates `s birth), mild to medium mental efficiency educatability in verbal and movement ,development of essential movement and physical skills is essential. Researches show that patients with Down syndrome are more fat about 120% higher than themselves ideal Weight [26] and in comparison to the health and normal people have higher body mass ,so cardiac failures and diabetes are a serious threat and risk factor for them. Because since a patient with Down syndrome is deeply affected by inheritance, and as unavoidable results related to chromosomes become disruption can be numerated some serious

problems in skeletal and muscular systems such as: muscular flaccidity, disturbed and extra feeble and softness in joints, less muscular power and short hands and feet, they are ready to affliction to skeletal and muscular disorders. Recognition the movement and physical disorders and complications and finding the reason and how to deal with their for processing are from most important aims to emboss these person's life style and process, and also it will give the time and chance to the patients with Down syndrome to despite their inheritance learning problems and defects and caused deprivations of others neglect to enter in the growth and improvement route [26] and with decrease their physical problems as least as possible and embossing their self-confidence provide the way and the field of suitable chances to educate and growth in their abilities' limitation [27].

MATERIALS AND METHODS

Subjects

30 girl students with Down syndrome from two Tehran`s exceptional centers were randomly selected with average 16.5 yrs and weight average about 60.76 kg and height average about 139.86 cm participated in this research.

Anthropometry and Somatotype Measurement

The somatotype of each subject was determined by the method described by Heater and Cather. It consisted of 10 anthropometric parameters (height, weight and four skin folds, two girths and two breadths (18). Body weight and height were measured with the subjects no shoes and only light clothing Body mass index (BMI), weight divided by height square (kg/m^2), was calculated according to the individual body height and weight. The height-to-weight ratio (HWR), height divided by the cube root of the weight, was used in somatotyping. The skinfolds (triceps, subscapular, supraspinal and medical calf), girths(upper arm and calf) and breadths (humerus and femur) Skinfold thicknesses were measured using the Skinfold Caliper, the tape meter and Collis on the right side of the body (8).The anthropometric somatotype was calculated the following equations:

endomorphy=-0.7182+0.1451 (X)-0.00068 (X 2)+0.0000014 (X3)

where X=(sum of triceps, subscapular and supraspinal skinfolds) multiplied by (170.18/height in cm).

This is called height-corrected endomorphy and is the preferred method for calculating endomorphy.

The equation to calculate mesomorphy is: mesomorphy = 0.858 x humerus breadth + 0.601 x femur breadth+0.188 x corrected arm girth+0.161 x corrected calf girth–height 0.131+ 4.5.

Three different equations are used to calculate ectomorphy according to the height-weight .ratio:

If HWR is greater than or equal to 40.75 then ectomorphy=0.732 HWR-28.58. If HWR is less than 40.75 but greater than 38.25 then ectomorphy = 0.463 HWR-17.63

If HWR is equal to or less than 38.25 then ectomorphy=0.1.

Then endomorphic, mesomorphic and ectomorphic numbers were taken. Afterward, all subjects were divided into three groups (endomorph, mesomorph and ectomorph).

Musculoskeletal deformities Assessment

Measurement the upper organ`s disorders by posture screen and New York`s standard test was used for application simplicity, doesn't need to the facilities and expensive tools, be safe, short duration of test apply and be fast. The posture screen which uses to the plummet as the reference and the basis is very useful and sufficient to body position`s screening and it is usable by the less preparation (skill) and the facilities. New York test is also created in education and training group related to the New York state. This test measures 13 different body postures and positions which 11 tests among them is related to vertebra column measurement and usually the person`s body posture registers in the background of this posture screen related to this test to increase the taken and measured visible considerations. Concurrent usage of New York test and (with) posture screen will be facilitated the disorder recognition and also, it will be increased the measurement accuracy. In an internal research by the name (New York test`s relates and clear and continues in power measurement the vertebra column) which is done by Ganji, after evaluation the measurements with two other researchers, it was cleared that continues and stable rate of New York test in measurement the vertebra column disorders (Kyphosis, lordosis, and scoliosis) has 95% confidence and reliable .But after these measurements with concurrent X-ray measurements it was cleared that New York test in measurement the vertebra column hasn't high clear and related accuracy [20]. Evaluation the vertebra column

posture by posture screen was applied from two inferior and posterior views. To recognize the Genu Varum and Genu Valgum complications and defects was used to the Caliper and to recognize the flat foot from talc powder.

Statistical Analysis

The data were analyzed using Statistical Package (SPSS) version 19. The relations were used by chi- square test. The level significance for Statistical Analysis was set at $p< 0.05$.

RESULTS

Table 1. Mean of Demografic and Anthropometric Parameters of subjects

Parameters	All=30	Endomorph	Ectomorph	Mesomorph
Age	16.53	16.53	15.33	20
Height	86 . 139	61 . 138	149.33	144
Weight	60.76	60.19	47.33	110
BMI	30.76	30.89	21.19	53.06
HWR	36.14	35.74	41.67	30.06
Endomorphic	7.84	8.38	5.16	10
Mesomorphic	4.44	2.67	0.66	10
Ectomorphic	1.25	0.59	2.66	0.5

Figure1. Distribution of Somatype

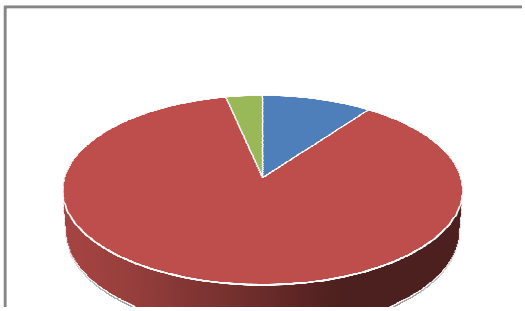

Table 2. Frequency and Percentage of subjects with respect to the BMI

BMI	Percentage	N
Normal	23.23%	7
Overweight	26.27%	8
Obesy	50%	15

There is not any skinny subject in this population

Table 3. Distribution of some of deformities with regard to the somatotype

Somatotype Distribution of some of deformitie	**N=30**		**Endomorph N=26**		**Ectomorph N=3**		**Mesomorph N=1**	
	N	**Percentage**	**N**	**Percentage**	**N**	**Percentage**	**N**	**Percentage**
Flat foot	29	%96.66	23	%88.46	1	%33.33	1	%100
forward abdomen	26	%86.66	24	%92.30	1	%33.33	1	%100
Genu Valgum	25	%83.33	23	%88.46	1	%33.33	1	%100
Lumba rLordosis	19	%63.33	18	%69.23			1	%100
Uneven Shoulders	18	%60	16	%61.53	2	%66.66		
NeckTorticollis	18	%60	15	%57.69	2	%66.66	1	%100
Back Knee	13	%43.33	13	%50				
Hallux valgus	11	%36.66	9	%34.61	2	%66.66		
Torticollis	6	%20	6	%23.07				
Kyphosis	3	%10	3	%10				
Scolisis	2	%6.6	2	%7.69				
Genu Varum	1	%3.33			1	%33.33		

Endomorph and Mesomorph

There is not any significance to relationship between somatotype with deformities (Neck Lordosis, Torticollis, Uneven Shoulders, Scolisis, Kyphosis, Back Knee, Flat foot, Hallux valgus) While, The significant relationship between Endomorph and Mesomorph with Lordosis, forward abdomen, Genu Varum and Genu Valgum were observed.

Table 4. Relationship between somatotype with some of deformities

Relation *somatotype with deformities	df	chi-Square	Sig	p
Neck Torticollis	2	0.78	0.677	
Torticollis	2	1.154	0.562	
UnevenShoulders	2	1. 581	0.454	
Scolisis	2	0.33	0.848	
Kyphosis	2	0.513	0.774	
LumbarLordosis	2	6.150	0.046	*
forward abdomen	2	8.254	0.016	*
Genu Varum	2	9.310	0.01	*
GenuValgum	2	6.092	0.048	*
BackKnee	2	3.529	0.171	
Flat foot	2	0.159	0.924	
Halluxvalgus	2	1.789	0.409	

DISCUSSION AND CONCLUSION

Collection data related to somatotype posture showed that this research samples from height ,weight and body mass index view are correlate to the samples related to the Bel Bahat (1992), Krimer (1996), Rymer and Fujio (1992), Asgari Zadeh (1996) and Moghaddam (2001) results and researches, too and taken results related to these researches and the current study showed that patients with Down syndrome have shorter height than normal and health persons and other mental retarders in addition to higher weight than the normal persons and other mental retarders, also patients with Down syndrome have higher BMI (body mass index) than normal persons. Among students with Down syndrome, 86.66% had endomorph body type, 10% had ectomorph and 3.33 % had mesomorph type. These researcher results related to Aeen (1982), Josef Budy and Luna Kapusy (1990), S P Singh (2007), Min-Kuhan (2000), Bronket and Barker (2000) researches also showed that the dominant somatotype among patients with Down syndrome are endomorph that these results is corresponding to the current research. This is if this research result had not corresponding to Kamal Raj`s research (2002), its reason was this, these mental retarded athletes sent to Para Olympic games had ectomorph somatotype. Existence high fat percent in body compounds and skinfold, being high BMI, effectiveness the genetic on the body size and metabolic disorders and non researchable around and peripheral environment are the main reasons to create the weight add and fatigue in these persons. Measurements related to prevalence amount of skeletal and muscular disorders in patients with Down syndrome and other mental retarders up to now showed That these groups of people have high percent about and in vertebra column disorders and also in lower organs. Bagulu Gonzelance (2006), Gauli M (2001),P Karptinner and Messellai Penitrio (1996), Brouk, Bruokson and Benson (2000), Pito Tilo and J.Human and Ashraf Etezedi all found the same results. In current study, also is confirmed high prevalence amount related to some kinds of disorders. In this research, patients with flat foot were 96.66% that it has corresponding to Agilu Gonzelanc about 86% and Galli Hall 87.17% `s results. Patients with Scoliosis disorder were 6.6% which it hasn't corresponding to Brook's results about 50%.It maybe this difference reason be different referred patients to Retoups medical clinic in 1981. Paitents with Genu Valgum were about 13.33% in this research which haven not corresponding to Piter Pineyter and Vemsai Pineyter`s results about 28.14% and Thumas`s results about 3.78%.The maybe reason for this difference were patients with Down syndrome and maternal knee joint dislocation. Special body characteristics, muscular hypotoni, unstable joints and joint disorders cause to walking change style and higher muscular and skeletal disorders in patients with Down syndrome which these problems and complications can cause themselves to less movement and decrease sport activities and this person will be fatigue and he /she will have secondary disorders. In this research, there isn't any significant relation among somatotype and affliction to some complications such as the forward head, Torticollis, Uneven Shoulders, scoliosis, kyphosis, back Knee, Halluxvalgus and flat foot. While there is a significant relation between some complications such as Lumbar Lordosis forward abdomen, Genu Valgum and Genu Varum. In this research, there was a significant relation between Endomorph and mesomorph somatotypes and affliction to lordosis which it isn't corresponding to Samaneh Moghaddam`s results, too (2009). But her samples were normal and health girls in range between 15-17 years old without any chromosomal disorders. And there is a significant relation between somatotype and also kyphosis with Moghadam`s results (2009). Evaluation the somatotype distribution and high prevalence of high weight among patients with Down syndrome shows that most of them were fatigue. By attention low movement, high prevalence related to muscular and skeletal disorders and physical problems and complications related to persons with trisomy21 such as muscular feeble and flaccidity, joint softness, muscular less power is recommended, too. In addition to complete attention to suitable feed and nutrition and weigh loss regimes with special care and necessary medical cares and presentation the educational and rehabilitation programs with confirm on focused processed movements on vertebra column`s disorders, these steps were effective for these persons and also passing and applying the processing movement programs in schools' physical training course`s times in exceptional schools causes to emboss the patients with Down syndrome to participate in sport activities and having the active life and happy life for them.

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