

**53 - THE INFLUENCE OF THE PILATES METHOD IN YOUNGSTERS WITH DOWN SYNDROME**

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**INTRODUCTION**

The human body can be in many ways compared to a machine which converts a form of energy into another when executing an action. Thus, the body's operation is maintained by a dynamic balance which needs activities in order to work normally. The breaking of this balance caused for instance by bad feeding habits or sedentary life may result in chronic degenerative diseases and emotional disorders. (BARBANTI, 1990).

The diagnosis process of mental deficiency according to the 2002 System of AAMR (American Association on Mental Retardation) requires the observation of three criteria: (a) the intellectual operation; (b) the adaptive behavior; (c) the age in which the manifestations or signs indicating delay in the development begin. (Paper presented at the round table discussion Mental Disability: diagnosis, classification and support systems according to the 2002 model from the American Association on Mental Retardation AAMR in the 32<sup>nd</sup> annual meeting of the Sociedade Brasileira de Psicologia. According to Lukasson and Colls (2002) mental deficiency is conceptualized as follows:

Mental deficiency or mental retardation is characterized by significant limitations in the intellectual operation and in the adaptive behavior, as expressed in practical, social and conceptual abilities originated before 18 years of age (p.8).

Considering the types of mental deficiency we can find Down Syndrome (DS) which is believed to be the most frequent form of mental retardation caused by a biologic accident. This syndrome is an anomaly which belongs to the group of mental deficiencies caused by a biologic accident.

According to Bonfim (1996), the person who discovered its genetic cause was the French doctor Jérôme Lejeune, but it had just become known worldwide in 1866 when the English doctor Langdon Down wrote the first scientific report which was based on the physical characteristics associated to the abnormal mental operation. (ABRANTES and SOUZA, 2001)

DS is a genetic alteration which occurs when the baby is being formed. At the moment of conception each germinative cell presents 23 chromosomes, that is 46 chromosomes; these chromosomes are placed in 23 pairs. In the individuals with DS there is a biologic accident in which one of the germinative cells presents 24 chromosomes, giving the individual 47 chromosomes in each cell, three of which in the 21<sup>st</sup> pair.

Children with DS present an extra chromosome in the cells of their body and it is this chromosome which produces alterations in their physical and mental development. (LEFEVRE, 1981)

There are three kinds of karyotypes in people presenting DS: Trisomy 21, which according to Bonfim (1996) is responsible for about 96% of the cases of the syndrome where there are three chromosomes in the 21<sup>st</sup> pair instead of two; Translocation trisomy which corresponds to 2% of the people with this syndrome and in this case a chromosome of the 21<sup>st</sup> pair is linked to another chromosome; and the Mosaicism which also corresponds to 2% of the population presenting Down Syndrome, where from a simple trisomy or a translocation trisomy, not all the cells multiply with an extra chromosome. In this case some get 46 and others 47 chromosomes, distributed in different proportions throughout the body.

Children with DS present symptoms such as generally moderated mental deficiency (under 50 IQ), generalized muscular hypotony, little movement coordination, slow march learning, mouth respiration, late speech, sensitivity to infections, articulation hyperextensibility, ligament looseness, small feet and short hands.

As we can observe, everyone with DS has mental delay. However that does not mean that they cannot learn what is taught to them. This learning will just be slower than what is considered normal.

Some anatomic and physiologic characteristics interfere directly in the performance of some physical activities such as generalized muscular hypotony when doing strength exercises, flat and small feet which may compromise exercises which need higher stability, atlanto-axial instability and tendency to develop heart diseases and hypothyroidism, which are responsible for part of the obesity presented by some of the syndromic children.

Although people with DS present various medical problems, it is necessary to point out that some of them do not have any pathology, having perfect health (BONFIM, 1996).

Nowadays life quality and health are often discussed and physical activities have been valued when related to those issues. Children, youngsters and adults who have DS, as every citizen have the right to enjoy the benefits brought by the practice of physical activities since those are directed and applied considering those people's organic and physical specificities and respecting the differences and limitations imposed by their bodies. It is important to remember that those difficulties do not prevent them from improving their global development and their life quality.

As can be observed, mental disability and DS do not represent people's attributes, but a particular operation state which considers not only the below-average mental operation but also limitations according to the adaptive operation which should be deficient in at least in two of the following ability areas: communication, self-care, domestic life, social and interpersonal abilities, use of community resources, self-sufficiency, academic abilities, work, leisure, health and security. (AAMR, 2002).

There is nowadays a concern about informing and creating opportunities to stimulate healthy behaviors in people with DS's everyday life. This is done through activities which promote healthy eating habits considering overweight, independence in daily tasks and regular physical activities. As there was an increase in life expectancy of people with DS, which in the 30s was about 10 years, in the 70s rose to 30 years and according to the latest research doubled to 60 years, works related to independence and promoting good health have been seen as an enterprise which means a preparation for a satisfactory old age for these young people with Down Syndrome.

The most likely explanation for the increase in life expectancy of this population is in the medical advances, which can nowadays detect and treat possible heart problems that children with Down syndrome may develop, early stimulation, social insertion and preventive treatments which are results of studies and research carried out in this area.

At this stage of the study it is important to briefly describe the Pilates method to elucidate its origins and its objectives so that the relationship between its proposals and its application to DS can be easily understood.

The Pilate method was created by Joseph Humbertus Pilates who was born in 1880 around Dusseldorf, Germany. From his early childhood Pilates was a very sick child, having rickets, rheumatic fever and asthma. Therefore he has since early dedicated to sports such as gymnastics, skiing, boxing and diving in order to become strong and healthy.

Alongside with his physical activities, the young Pilates were also concerned about human physiology, especially the body muscles. He studied various western and eastern physical conditioning techniques. The combination of these practices contributed later to the formulation of his method, which in the beginning was called "Contrology".

As time went by Pilates improved his technique by creating and developing new devices which helped people to use their body in a more functional way, by using the strength center (core) and breathing to obtain better result as doing exercises.

The Pilates method became famous all over the world and is used not only by people who want to be fit but also by those who aim to live a healthier life.

According to him:

The perfect balance between body and mind is that quality of the civilized man, which gives him not only superiority over the wild and animal kingdom, but also all physical and mental powers which are indispensable to achieve humanity's goal to live with health and happiness. (Joseph H. Pilates., 1945.)

Nowadays people worldwide are becoming more aware of the importance of the good physical condition so as one can lead a happy and healthy life. However, in contrast with this awareness people are also becoming less active due to the technologic advances which have provided us with remote controls, electric car windows, computers and other labor saving devices with which you do not have to leave your chair to perform a number of tasks.

While calling his method "Contrology", Pilates also established the six basic principles which guide it: concentration, control, the center, breathing, precision and fluid movement.

For Pilates it was necessary to be aware of all parts of the body to perform the exercises. One should pay attention to each step for this is the way to notice how all body movements are related. Visualizing the movements step by step helps the central nervous system to choose the correct combination of the movement to perform the exercise. When mind and body work together, we can achieve excellent performance.

The movement should be controlled and coordinated by the mind, justifying its connection with concentration. The movement control becomes harmonic without overcharge or muscular compensation" (CAMARÃO, 2004)

The center is the fundamental axis of the method and Joseph H. Pilates called the center of the strength "Power House". This is the center from where all the movements are originated and it encompasses the abdomen muscles, the lower part of the back and the buttocks. These muscles support the spinal cord, the internal organs and the posture. All exercises in the Pilates method focus on the center of strength (Power House) to obtain the trunk stabilization allowing the body to lengthen and to do the movements more effectively. In order to initiate any movement, the center has to be activated and its strengthening is a natural consequence of the method.

The breathing itself is the great differential to obtain relevant results using the Pilates method. Efficient breathing stimulates cells and feeds blood oxygenation, eliminate harmful gases and together with the exercises helps to relax the muscles reducing their tension and contributing to control the movements.

The differential of the method is in its creator's holistic vision of "mens sana in corpore sano" (sound mind in sound body). Through this the person practicing the method benefits from the integration of body and mind, the mental conditioning, the stress and chronic pains relief, the improvement in self-esteem and body awareness. In addition to that, the method increases muscular strength, improves breathing capacity, flexibility, balance, coordination and good posture.

Joseph Pilates developed and perfected his method throughout his life and linked oriental techniques (flexibility, breathing and control) and western techniques (strength and resistance), creating a revolutionary method which is his legacy available to all who want to try it. (GALLAGHER and KRYZANOWSKA, 2000).

The benefits of the method have been recognized in many countries by its instructors who confirm its effectiveness in rehabilitation and prevention of diseases as well as the improvement of physical and mental condition.

We know that we cannot change an individual's genetic inheritance but his/her daily habits can be modified. From this perspective the Pilates method aims to provide a more active and positive life concerning physical and psychological aspects which contribute to improve DS teenagers' life quality. Although the classes are developed in groups, the individual differences should be observed and respected as well as the potentialities and the limiting aspects of each one of the participants in the research.

It is possible to find great research production concerning the effects of physical activity on life quality and questions related to obesity. However, when it comes to the Brazilian population with mental disability and especially to youngsters with DS, the studies which connect the development of some physical capacities related to health are still scarce.

Considering the possibility to contribute to the development of some physical capacities, especially balance, strength, flexibility and coordination of young people with DS, this research aims to verify the effects of Pilates classes given to these youngsters on the acquisition of some capacities.

## METHODOLOGIC PROCEDURES

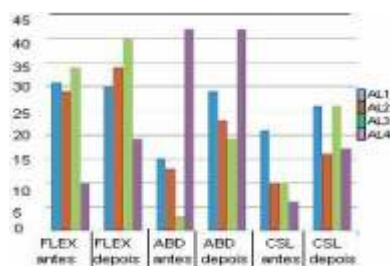
This research is about a case study of transversal, the sample was composed of four students. Two of them were female with chronologic age of sixteen and twenty years and two male with chronologic age of sixteen and 21 years, from the Sociedade Educacional Juliano Varela (Juliano Varela Educational Society).

The exclusion criterion was the student's having Atlanto-Axial instability or any medical restriction of the practice of physical activities.

In order to carry out the test and the twenty sessions of the Pilates Method, the parents were sent the term of Free and Clarified consent and the test applied were sitting and reaching test (Wells bench); KTK motor coordination test (lateral jump and monopedal jump) and localized muscular resistance test (abdominals). The methodology of the study consisted of a pretest and a posttest carried out after twenty sessions. The sessions took place in a Studio with Pilates Method equipment, twice a week during one hour each session. In the graphs and in the result discussion the students will be called AL1 (male), AL2 (female), AL3 (female), AL4 (male).

## PRESENTATION OF RESULTS

Figure 1 Results the Flexibility, Abdominal and Coordination tests pre and post intervention



The center represents the fundamental pillar of the method. Joseph H. Pilates called the strength center “Power House “and this is where all the movements of the body are originated. This center encompasses the abdomen muscles, the lower part of the back and the buttocks. These muscles support the spinal chord.

In people with Down Syndrome, muscular hypotony is present even in the abdominal muscles which are flaccid and prominent due to the overweight some individuals have. This hypotony and flaccidity generally cause bad posture in these people. For strengthening the abdominal muscles, the lower part of the back and the muscles in the gluteus region, the Pilates method can help to improve this posture. In the first sessions of the program developed , the students were taught to find the neutral pelvis and to develop thoracic respiration. In the neutral pelvis the curvatures of the spinal chord would be preserved. The thoracic respiration consists in filling the lungs with air, making the ribs lateralization, and when inspiring, lower the ribs at a maximum level.

This respiration keeps the abdomen always contracted. The graph presents a very significant improvement in the students’ posttest in the abdominal resistance test, especially considering AL3 who differed from AL4, who stayed the same. However, if we consider the genders, it is possible to perceive a difference in the male gender before and after the program as far as abdominal musculature is concerned.

Although the program did not include any activity directed to the work with flexibility, there was an improvement in the results, better represented by AL4 who is a male. However, flexibility before and after the program had higher values among the females. It is important to point out that the work with strength integrated to the articulation hyperextensibility and ligament looseness is relevant to prevent injuries and articulation accidents.

The movements of individuals with DS are slow and uncoordinated. Due to this characteristic, we feel challenged and instigated as we carry out the KTK Motor Coordination test. This is the lateral jumps test and aims to check the speed in alternated jumps done as fast as possible in 15 seconds . In this test , AL1, AL2, AL3 and AL4 had better results that those presented in the pretest. It is worth mentioning the result reached by AL3, which was the same as AL1’s , who is his turn presented little difference considering the pretest.

The far as low speed is concerned, there was no significant difference between the genders, which proves this aspect is a characteristic of Down Syndrome.

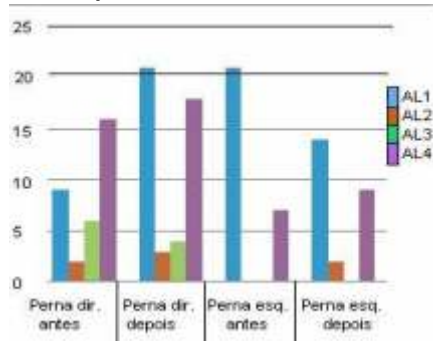


Fig.1 half waterfall



Fig.2 Roll up with elastic band

Figure 2 Result of the Monopedal Jump test



According to Gorla (2001), this test aims to check the coordination of the lower limbs; dynamic/strength energy. The analysis of the child’s performance is made through quantitative measurements of the movement, registering the number of monopedal jumps in different heights. The initial height as a valid passage is based on the result of the rehearsal exercise and on the individual’s age. This aspect is underlined to highlight the age established as criterion for the test and set the height in which it would be initiated. This was one of the adaptations which we made considering two factors which guide this study: its objective is firstly to apply the Pilates method and secondly to strengthen the participating students’ lower limbs regardless of their chronologic age.

In the pretest all the students were well as we could notice in the graphs. In the posttest AL1 had a cold and was taking antibiotics, what made him not stimulated and quite apathetic. We know that attention deficit, anxiety, distraction and shyness contributed to a non satisfactory performance of some tasks. In this study, other variables such as AL2’s pre menstrual syndrome which caused resistance in taking the test and AL1’s cold may have influenced their results.

As to the posttest result presented by the right leg, except for AL3’s , all of them presented a better performance which can be related to the work with strength in the lower limbs carried out during the twenty sessions , some of which is exemplified in the pictures 3 and 4 .

One of the congenial problems associated with DS is hypotony, which is characterized by muscular and ligament flaccidity and accompanies the individuals throughout their lives. This hypotony intensity varies according to the individual and in some cases people can be erroneously classified as hypotonic for presenting a higher percentage of adipose tissue, what makes the evaluation process difficult. Because hypotony is so complex and affects the great majority of this population, some issues related to it as still being discussed in the literature such as the best way to minimize it. Thus, considering the graph above, we can notice that there was an increase in both legs’ strength after the development of the exercise program for this group of students.

In the pretest AL2 and AL3 could not perform the task with their left leg. That’s why these students don’t appear in the graphs. In the posttest just AL2 could perform the task.

Fig.3 Stomach Massage



Fig.4 Leg Circles



### Final Considerations

The results show that the use of a differentiated program of physical activities, in this case the Pilates method, produced a significant improvement in the physical capacities of the youngsters involved in this study. These gains may indicate a favorable possibility of improvement in life quality of young people with Down syndrome, since we know how important and necessary physical activities are in this phase. Differences between genders in the evaluated capacities were also observed and it indicates that other studies should be carried out using this method, but considering this distinction or comparing them. Taking into account that this is a small group with differentiated characteristics, it is necessary to develop more studies involving this population so that we can be able to discuss and exchange academic knowledge. By doing so it will be possible to have a better understanding of the benefits of physical activity, specifically the Pilates method, in improving physical capacities.

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### THE INFLUENCE OF THE PILATES METHOD IN YOUNGSTERS WITH DOWN SYNDROME

#### ABSTRACT

Joseph Pilates developed and perfected his method throughout his life. He linked oriental techniques (flexibility, breathing and control) to western techniques (strength and resistance), creating a revolutionary method he called "Contrology" and its Center of strength was the "Power House ". All the movements are originated in this center and it encompasses the abdomen muscles, the lower part of the back and the buttocks. Considering the possibility to contribute to the development of some physical capacities, especially strength, flexibility and coordination of some youngsters who have DS, this research aims to verify the effects of Pilates classes given to these young people in the acquisition of these capacities. This is a case study of transversal cut with qualitative predominance. The sample was composed of 04 students, 02 females with chronologic age of 16 and 20 years and 02 males with chronologic age of 16 and 21 years. The tests applied were sitting and reaching (Wells bench); KTK Motor Coordination test (lateral jumps and monopedal jump);and Localized Muscular Resistance test ( abdominal). The work methodology consisted of a pretest and a posttest carried out after twenty sessions becoming evident that after the implementation of the method was an increase of strength in both legs in addition to the significant improvement in test abdominal strength, with differences between the masculine and feminine genders which may indicate a favorable opportunity for improving their quality of life of teenagers with Down syndrome, because we know the importance and necessity of physical activities at this stage.

Keywords: Down syndrome, Physical Capacities, Pilates Method

### L'INFLUENCE DE LA MÉTHODE PILATES CHEZ LES JEUNES ATTEINTS DU SYNDROME DE DOWN

#### RÉSUMÉ

La méthode Pilates a été créée par l'allemand Joseph Pilates Humbertus visant à devenir physiquement fort et sain, avec le passage du temps Pilates a été l'amélioration de sa technique, la création et le développement de nouveaux équipements qui ont aidé les gens qui transportait son corps à utiliser d'une manière plus fonctionnelle, en utilisant la force center (de base) et de la respiration de parvenir à un meilleur résultat par une meilleure performance dans les exercices. Le syndrome de Down (DS) est une anomalie qui se produit au sein de la déficience mentale, causée par un accident survenu entre le biologique et montrer aux autres symptômes: hypotonie musculaire généralisée, la mauvaise coordination des mouvements, la lenteur dans l'apprentissage de mars, hiperextensibility articuler, ligamentous laxisme, les pieds et les petits plans à court et à la main et que certains de ces déficits pourraient être améliorées avec la méthode Pilates, cette recherche est une étude de cas de la section transversale avec l'échantillon se composait de 04 étudiants et 02 femmes avec l'âge chronologique de 16 et 20 ans et 02 hommes avec l'âge chronologique de 16 et 21 ans, la société de l'éducation Julian Varela qui dessert les personnes ayant le syndrome de Down qui ont été soumis à la méthode Pilates et ont été évalués au moyen de tests de neuro-variantes: Essayer de s'asseoir et d'atteindre ( Banque de puits); test de la coordination motrice KTK (sauts de côté et de sauter monopedal); localisée essai d'endurance musculaire (abdominaux), après vingt sessions devient évident que, après la mise en œuvre de la méthode a été une augmentation de la force dans les deux jambes en plus de l'amélioration significative, Les essais de force abdominale, avec des différences entre le masculin et le féminin mai sexes qui indiquent une occasion favorable pour améliorer leur qualité de vie des adolescents avec le syndrome de Down, parce que nous savons l'importance et la nécessité d'activités physiques à ce stade.

Mots-clés: le syndrome de Down, capacités physiques, méthode Pilates

**LA INFLUENCIA DEL MÉTODO PILATES EN JOVÉNES CON SÍNDROME DE DOWN****RESUMEN**

El método Pilates fue creado por el alemán Joseph Pilates Humbertus que pretendan ser físicamente fuerte y saludable, con el paso del tiempo Pilates ha mejorando su técnica, la creación y desarrollo de nuevos equipos que ayudaron a la gente que llevó su cuerpo a utilizar de una manera más funcional, utilizando la fuerza de centro (esencial) y la respiración para lograr un mejor resultado por un mejor rendimiento en los ejercicios. El síndrome de Down (SD) es una anomalía que ocurre dentro de la discapacidad mental, causado por un accidente entre la diversidad biológica y muestra otros síntomas: hipotonía muscular generalizada, la mala coordinación de movimientos, lentos en el aprendizaje de marzo, hiperextensibilidad articular, laxitud ligamentous, pies y los pequeños planes a corto y manos y que algunos de estos déficits podría ser mejorado con el método Pilates, esta investigación es un estudio de caso de la sección transversal con una muestra consistió de 04 estudiantes y 02 mujeres con edad cronológica de 16 y 20 años y 02 varones con edad cronológica de 16 y 21 años, la Sociedad de la Educación Julian Varela que sirve a las personas con síndrome de Down que se presentaron a la método Pilates y fueron evaluados mediante pruebas de neuromuscular variantes: Trate de sentarse y llegar a ( Banco de Wells); prueba de coordinación KTK motor (lado salta y salta monopedal); localizado ensayo de resistencia muscular (abdominales), después de veinte períodos de sesiones cada vez claro que después de la aplicación del método se produjo un aumento de la fuerza en ambas piernas, además de la mejora significativa, Las pruebas de fuerza abdominal, con diferencias entre lo masculino y género femenino lo que puede indicar una oportunidad favorable para mejorar su calidad de vida de los adolescentes con síndrome de Down, porque sabemos la importancia y la necesidad de las actividades físicas en esta etapa.

Palabras clave: síndrome de Down, capacidades físicas, Método Pilates

**A INFLUÊNCIA DO MÉTODO PILATES EM JOVENS COM SÍNDROME DE DOWN****RESUMO**

O método Pilates foi criado pelo alemão Joseph Humbertus Pilates objetivando tornar-se fisicamente forte e saudável, com o passar do tempo Pilates foi aperfeiçoando a sua técnica, criando e desenvolvendo novos aparelhos que ajudavam as pessoas que o praticavam a usarem seu corpo de uma forma mais funcional, usando o centro de força (core) e a respiração para obterem um melhor resultado através de uma melhor performance nos exercícios. A Síndrome de Down (SD) é uma anomalia que ocorre dentro das deficiências mentais, causada por um acidente biológico e apresentam entre outros sintomas: hipotonia muscular generalizada, pouca coordenação de movimentos, lentidão na aprendizagem da marcha, hiperextensibilidade articular, frouxidão ligamentar, pés pequenos e planos e mãos curtas sendo que alguns desses déficits podem ser melhorados com o método Pilates, esta pesquisa trata-se de um estudo de caso de corte transversal com amostra foi composta por 04 alunos sendo 02 do sexo feminino com idade cronológica de 16 e 20 anos e 02 do sexo masculino com idade cronológica de 16 e 21 anos, da Sociedade Educacional Juliano Varela que atende pessoas com Síndrome de Down que foram submetidas ao método Pilates e foram avaliadas através dos Testes das variantes neuromusculares: Teste de sentar e alcançar (Banco de Wells); Teste de Coordenação Motora KTK (saltos laterais e salto monopedal); Teste de resistência muscular localizada (abdominal) após vinte sessões ficando evidenciado que após a aplicação do método houve um aumento de força nas duas pernas além da melhora bastante significativa, no teste de resistência abdominal, com diferenças entre os gêneros feminino e masculino o que pode indicar uma possibilidade favorável de melhora na qualidade de vida de adolescentes com Síndrome de Down, pois sabemos na importância e necessidade de atividades físicas nesta fase.

Palavras-chave: Síndrome de Down, Capacidades físicas, Método Pilates