

## The Importance of Early Child's Involvement with Down Syndrome in Kinesiotherapy Treatment

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### Abstract:

*The goal of early inclusion of children with Down syndrome into a kinesiotherapeutic treatment is going to speed up the rate of gross motor development, as usually assumed. The goal is to minimize the development of abnormal patterns of compensatory behavior that children with Down syndrome tend to develop. For many newborns and children with Down syndrome, the backwardness in acquiring of motor skills and posture control limits the opportunities for experiencing movements and explorations. As a consequence, it presents a significant challenge in optimizing their developmental path. This paper describes closely the problems of children with Down syndrome, the goal of kinesiotherapeutic treatment and case study of early inclusion into the treatment. It is important to emphasize that gross motor development is the first learning task that a child with Down syndrome is facing with, and that in this way the parents receive for the first time an opportunity to explore how their child learns.*

**Key words:** Down syndrom, kinesiotherapy, strengthing.

## **1. Executive summary**

The aim of the early inclusion of children with Down syndrome in physical exercise did not accelerate the rate of development of gross motor skills such as is commonly assumed. The goal is to minimize the development of abnormal compensatory patterns of behavior that children with Down syndrome tend to develop. Early kinesiotherapy makes a crucial difference long-term functional outcomes in children with Down syndrome. For many infants and children with Down syndrome, retardation in the acquisition of motor skills and posture control limits the possibilities for movement experience and research. As a consequence, it is a significant challenge and optimize their development path. This paper is described as more detailed issues of children with Down syndrome, the goal of treatment of kinesis and display cases of early involvement in treatment. It is important to emphasize that the development of gross motor skills, the task of learning with whom a child with Down syndrome first meets and thereby also provides parents the first opportunity to investigate how their child is learning.

## **2. Introduction**

### **2.1 Kinesiotherapy**

Kinesiotherapy ( Kinesis - moving; therapeia - serving the cure) is a branch of applied kinesiology, which studies the principles governing the process by exercise and the effects of these processes on the human body which are generally reduced capacity due to injury, disease or congenital defects. Indicates one of the methods of physical medicine and rehabilitation and uses the established legality kinesiology science applied through kinesiotherapeutical procedure. Kinesiotherapy is non-specific and functional, relational not an exclusive means of

treating certain diseases. In some cases kinesiotherapeutical programs are used as the only basic treatment, while in other cases the extra methods in general characteristic of treatment for a particular disease.

Kinesiotherapy share with respect to the area of application to:

- Preventive kinesio therapy
- Functional kinesio therapy
- Clinical kinesio therapy

**Preventive Kinesiotherapy:-** includes procedures that are carried out before a disease occurs. Most often used in children in developing countries, pregnant women, people the seniors and post operative course.

**Functional kinesiotherapy:-** with the management of the process by training and monitoring its effects in patients with irregular functional disability system to run. It is applied in patients with general disorder of posture, keeping scoliotic, kyphotic keeping, flat or round back, the first level down of the foot.

**Clinical Kinesiotherapy:-** with the management of the process by training, application of specific modalities and intensities particular dosage depending on the individual and his condition.

### **2.1.1. A typical psychomotor development of the child in the first year of life**

Infant in a position to stomach turns his head to either side, arms bent and fists clenched, legs bent and spread out to the side with your feet up, a bowl is lifted from the ground. Lying on her back the child is in an unstable position, the spine is bent to the left or right side, arms bent at the elbows next to the body, legs spread and bent at the hips and knees, and feet are

raised. Participants were primitive reflexes. Touching the soles under the fingers causes a reflex catching his foot and tapping palm reflex touch his hand. Sudden touch of child reacts whole body, Moro reflex. Touching the lips causes the sucking reflex, a cheek or corner of the mouth reflex of looking. End of the first month in the supine position is set to fixed mother or an object view maintains the position of the head in the middle position for a few seconds. Does not hold the balance lies with the body at an angle. The legs are bent or completely relaxed. Fingers on the palm are tightly closed but not completely squeezed in the hand. The position of the stomach is unstable and relies on the cheek, forearm and chest. Briefly auditors head, pelvis is lifted, and the legs bent at the knees and hips.

End of the second month in a supine position, although it is the first signs of apprehension, the child still lies insecure. On turning his head to the side extremities react "attitude swordsman." Interest in the environment monitored very tivahni movements of arms and legs, hands the increasingly open. The position on the stomach auditor's head in the middle position. It relies on the forearm, a focus of the body is shifted to the sternum. The pelvis is lowered to the ground, yielding a strong bent leg.

End of the third month in a position to support the abdomen at the elbow and pelvis, key priorities body moves toward the navel. The elbows are under your shoulders, pelvis almost to the ground, his head curiously auditors. Lying on her back safely. The hull is in line nose-chin-sternum -navel-pubic bone. Establishes the coordination of eye-hand-mouth. There are first isolated movements. End of the fourth month in a position to stomach both elbows lie in front line shoulder raises one hand relying on the other. Keeps her balance on her stomach and begins with the transfer of the balance to the side. At the same time captures the hands and feet. Catches bimanual ulnar grip.

End of the fifth month on her stomach, position rests safely with reliance on the hand. The focus is on the abdomen, and pelvis and thighs lie on the ground. At this stage, there is a "swimming". The position on the back reveals the thigh begins to turn and catch objects and fingers outstretched thumb. Subject switches from hand to hand, turns in the direction of the sound source. End of June on her stomach, auditors whole chest so that the focus of the dish, which is on the surface. They have been given to the elbows, and hands open. The dorsal position of the hand reveals foot backside of the substrate auditors stretching lumbar. He turns to ice on his stomach and there is differentiation leg. Cases catches over the middle of the body.

End of the seventh month transmits the weight of the body on the thigh and short stretches the body to the knees. Raises one hand in the palm hand-bowl. Coordination mutilation establishments foot was adopted. He turns to both sides, identified spatial distance. End of the eighth month of the weight of the body is transferred to the back, pelvis is lifted from the ground and it is a mainstay mutilation knee. Reveals lateral position and are happy to play on the side. Dita sideways relying on the lower arm and elbow. He turns on his stomach and back. It develops fine motor skills and radial trapping. Starts capture opruđenim fingers and thumb. End of September reliance on a handful of front body, torso approaching natural sitting position. Sits diagonally pute with items and reveals the kneeling position.

End of the tenth month in fourpoint position carries the weight of the arms and legs. Descends in oblique position to sitting on the side. The creep auditors one leg, Dite with the objects and works step by adherence. Standing with adherence, captures subjects 'tweezers' grip. End of the eleventh month baby coordinated PUTEU, sits over the side of the right sitting position. Sit freely walk sideways along the wall and catching objects 'pliers' grip. End of the twelfth month of the child pute

over obstacles. Very short stays in a sitting position. Standing alone, walking freely. Occurs first playing with a ball.

### **2.1.2. The normal postural tone**

Sherrington, (1947), points out that the normal movement requires normal muscle tone. The central nervous system provides information about the movement and function throughout a series of muscles that interactively participate in the realization of motor activity.

Normal muscle tone you:

- maintain normal posture against the force of gravity
- adaptation to variable force support
- selective movement to achieve functional activity (Bobath 1990.; Edwards, 2002)

Distribution and intensity of postural tone is influenced by the size of the base of support. The larger the base of support and a lower center of gravity, it takes less effort to maintain the position and stability. When talking about the normal tone, especially muscle tone should not be in conflict with the movement, which means that its intensity must allow movement. Should be neither too low nor too high, but still high enough to allow for antigravity movement. Coordination of movement is dependent on muscle tone (Grozdek & Macek, 1995).

### **2.1.3. Hypotonia**

Hypotonia or low muscle tone can be based on the actual muscle. If low muscle tone is derived from the muscles (muscular dystrophy), then there is a dysfunction within each muscle. Receptors within the muscle does not bring the right signals to the brain to warn the child's system of changes in position. Often appear sensory processing deficits (vestibular, proprioceptive and tactile) that warn the brain to changes in body position.

A young child with hypotonia may have poor head control and resist supporting on his belly when she is awake. Babies often lie with arms and legs out, resist keeping weight on their legs when they are gently placed on them. Since skills gross motor blocks to build a future more gross motor skills and fine motor skills, it is recommended that children be involved in therapy in order to facilitate appropriate motor development. Muscle tone is improved access a major treatment to improve the postural control and specify a nervous problems within systems that help to understand the brain, where the body is located within the space. Due to the low muscle tone also associated with looselied or relaxed child's ligaments, the therapy also aims to improve overall muscle strength to improve the support around the joints of arms and legs.

## **2.2 Down syndrom**

Down syndrome was first described by English physician John Langdon Down, while the cause of the 1959 discovered by the French geneticist Professor. Jerome Lejeune. It has been discovered that the 21 pairs of chromosomes is another chromosome. Instead of the two that was located three chromosomes. Which means that in the whole cell instead of 46 a total of 47 chromosomes. As there are three copies of chromosome 21, Down syndrome is often referred to as a "trisomy 21."

Despite years of research, the reason for the emergence of such a division of cells is still unknown. Form occurrence of Down syndrome is not dependent on external factors, nor can it be the influence. Affects all racial groups and can occur in any family, regardless of their parents' health, economic situation, or way of life. It is known also that in women over the age of 35 more likely (1 in 400 children) of births of children with Down Syndrome. The risk increases with age and is so in women over 40 years the risk of 1: 110, and in women over 45 years even 1:35.

### **2.2.1. Diagnosing**

Newborn baby with Down syndrome often has physical features the attending physician can be identified already at birth. But in order to confirm the diagnosis, the doctor will request a blood test called a chromosomal karyotype. It involves growing cells from baby's blood for 2 weeks, followed by microscopic examination of chromosomes in order to determine whether there is an excess of material in the chromosomes 21<sup>st</sup>.

### **2.2.2. The clinical picture**

The diagnosis of Down syndrome usually can be suspected immediately after birth, due to a specific physical appearance of the child. The clinical picture was marked with diversity, chronicity and severity of abnormalities that include a general halt the development of chronic inflammatory lesions and a variety of native and acquired defects.

The most common characteristic seems to be characteristics of a child with Down Syndrome are:

- Muscular hypotonia
- The flat, ambiguity face
- Pitched position of eye opening
- Flat root of the nose is often aggregated with the underdevelopment of the nasal bones
- The oral cavity is a small, high and narrow palate
- Wide neck, usually short, with too much skin and fat
- Shorter chest unusual shape
- Short and broad hands and feet

In addition to the above physical characteristics of Down syndrome accompanied by mental retardation, which ranges from mild to severe. The reduced intellectual functioning limits the development of skills necessary for functioning in everyday life. There are also other problems of health conditions such as congenital heart disease, hearing problems, problems with pipes, celiac disease, vision problems, and many others.



During the first days and months of life, some disorders can be diagnosed immediately. Congenital hypothyroidism, which is characterized by a reduced basal metabolism, increase thyroid glands, and disorders of the autonomic nervous system, are happening more frequently in babies with DS. Routine blood test to hypothyroidism, which is carried out on infant will reveal whether there is such a condition. Several other well-known medical conditions, including hearing loss, congenital heart disease and visual impairment, prevalent in people with DS.

Average half of children with DS have congenital heart disease that is linked to the start of pulmonary hypertension, or high blood pressure in the lungs. Echocardiography may help identify any congenital heart disease. If the defects were identified before the start of the pulmonary hypertension, the operation provides good results. Epilepsy, although somewhat less common than other medical conditions, and further affects 5 to 13% of people with DS, which is 10 times higher than the frequency in the general population. There are unusually frequent appearance of children's spasms or seizures in children aged 1 year, some of which are accelerated neonatal complications and infections and cardiovascular diseases. However, these attacks may be treated by anti-epileptic drugs.

### **2.2.3. Treatment**

Down syndrome is not a condition that can be treated. Therefore, early intervention best way to treat a child with Down syndrome. The concept of early intervention refers to the area of specialized programs and related resources that provide various rehabilitation specialists. Some of these experts are physiotherapists (kinesiotherapists), occupational therapists and speech therapists.

**Occupational Therapy:-** will help the child with oral-motor problems feeding referring to the positioning and feeding

techniques. As the child grows, occupational therapists will help your child develop fine motor skills, including the small muscles needed to receive certain items. Down syndrome can cause low muscle tone, decreased strength and ligament laxity of the joint. An occupational therapist can also help you with the typical skills of independent feeding, dressing and personal hygiene.

**Logotherapy:-** children with Down syndrome usually have a different range of language and communication skills. Intervention early communication with the speech therapist can help a child in expression language. Individual logotherapy may be aimed at the individual voice errors, increase speech intelligibility, and in some cases encourage advanced language and literacy.

It is important to start with speech therapy before the child spoke his first word. This will alleviate the frustration that comes from the inability to communicate needs and desires. If necessary, the child's speech and language therapist will also propose oral motor exercises and activities to strengthen muscles and improve coordination of these muscles.

**Physical / kinesiotherapy:-** the degree of involvement of the child's gross motor skills varies. Kinesiotherapists and therapist through The exercise helps attain the best potential of the child. There are four factors that affect the gross motor skills of the child: decreased muscle tone (hypotonia), increased flexibility in the joints, decreased muscle strength and short arms and legs. No kinesiotherapy due to improper use of their muscles child may have significant orthopedic problems.

### **2.3. Aspects of motor development in Down syndrome**

During the first year of life, typically evolving children make tremendous progress in motor development. Using your hands, are achieving greater balance in straightened position and

progressing from sitting to crawling, standing and walking. Start of movement is one of the major transitions during early development and is reflected not only in changes in motor skills, but also in perception, cognition space, social and emotional development. As a small child becomes increasingly more mobile and begins explore environment, learn not only about your own body but also objects, places and events that have consequences for the mobile survey. Walking has huge implications for all areas of development. Opportunities for exploration, play, and interact with peers increases significantly.

For many children with Down Syndrome delays in motor development and control of posture undoubtedly limits the motor starts and motor research. Given the findings from the literature on typical development we can assume that the motor standstill negatively affect the experience of the total movement available to a child with Down Syndrome. It also will affect the development of perception, knowledge of the area and motor learning.

**Milestones gross motor skills in children with Down Syndrome:-** children with Down Syndrome will develop major milestones including walking, running and climbing stairs. But in order to perform, you will develop strength and control of the muscles of the neck, arms, abdomen and legs. You will learn how to balance your body at every position and during gameplay. Therefore, the intervention kinesiotherapy teach a child how to develop gross motor skills without the use of abnormal movement patterns that often occur as a result of hypotonia and hypermobility.

### **2.3.1. Development of fetching and walking in children with Down syndrome**

Fetching consists of two components: transmission (lead hand to the object) and handling (fingers are open and ready to grab

and then closed to create appropriate catch-position). Retrieve and raking must be coordinated in time and space so that the fingers remain open until the hand reaches the object. For a typical child development, functional retrieval begins at the age of about 4 months. Reach for the usually clumsy but within a few months to become more coordinated and correct. There are numerous factors that influence the development of retrieval in infant with Down syndrome. Hypotonia or low muscle tone can affect the muscles along the entire body.

Low muscle tone in the muscles of the trunk may affect the stability of posture, and thus make it difficult to maintain balance while the infant is trying to lean forward and reach the subject. Furthermore, hypotonia of the muscles around the shoulder joint, the forearm and the hand may result in increased co-contraction, making a grab handle and quite challenging.

Walking is extremely A complex skill and there are many factors that influence the development of walking in typically developed children. Successful movement requires control and coordination of multiple joints, the creation of appropriate force, the activation patterns of specific muscle, the setting changes in center of gravity, and coordination of information from the visual, auditory, vestibular, and proprioceptive systems. These forms must be aligned with the appropriate timing and must take into account the objective of the task, and changes in the environment. Factors such as muscle strength, stamina and fatigue also influence the movement.

Independent walking may occur within a broad time frame of 13 to 48 months. Reduced muscle strength and / or lack of control of posture and balance skills are some of the factors that are believed to contribute to the start of walking backward. For immature walking pattern is observed in individuals with Down's syndrome is considered to result from the low and the mechanism of the fifth finger of sheet, which is

partly due to a dysfunction in the kinetics of the related with the movements of his ankles. Compensatory movements observed during walking correlated with abnormal base of support and contact flat feet to the ground. Qualitatively, children with Down syndrome show a weak shock forms the heel and instability during the support phase of walking, where their weight is currently being transferred to one leg. The movements of the hands may also be poorly controlled and look stiff. Ulrich and colleagues recently conducted a survey to determine whether the use of a motorized conveyor belt could help reduce the backwardness in the beginning of walking with the infant with Down syndrome. Infants were randomly divided into two groups - the control and intervention. All infants received physical therapy at least every other week. Infants in the intervention group practiced walking on a specially built up a small treadmill five days a week for eight minutes a day. The authors reported that infants in the intervention group learned to walk before the infant in the control group. These results are interesting and encouraging but require further research before wide acceptance by exercise as an intervention tool.

For many infants and children with Down syndrome, retardation in the acquisition of motor skills and posture control limits the possibilities for movement experience and research. As a consequence, it is a significant challenge and optimize their development path.

### **3. Goal working**

For many infants and children with Down syndrome, the delay in the acquisition of motor skills and posture control limits the possibilities for movement experience and research. As a result, it represents a significant challenge and optimize their development path. The aim of this paper is the overview of the basic problems of motor development in Down syndrome, with an emphasis on the importance of early initiation of therapy, as

well as more detailed case report that shows how the performance of therapy.

#### **4. Importance of inclusion of children with down syndrome**

##### ***In physical exercise:***

As noted earlier, children with Down syndrome usually develop orthopedic problems arising from genetic irregularities in their bones, muscles and joints. Such children develop irregular posture and movement pattern compensated due to hypotonia and loss of ligaments. The exercise of such therapy, however, the strength proactively builds the corresponding muscle groups.

##### ***Spine and posture***

One of the first challenges facing the new baby with DS is sitting upright. Kyphosis - an abnormal rounded shoulders and upper ice forward - early may arise due to laxity of ligaments, muscle hypotonia and reduced troop strength that makes kids settle forward, the posterior slope of the pelvis, rounded body and head laid back on his shoulders. Physical therapy can teach them to sit upright and thus avoid breathing difficulties and a reduced ability to rotate troops associated with the posture.

##### ***Match***

Kinesiotherapy teaches children with Down syndrome to use the right muscles for walking and increase their strength. Such children have unsteady gait due to their weak leg muscles and loose ligaments. They compensate by walking your feet wide apart, fixed the knees and feet pointing outwards. The problem of such a situation is painful walking, and loss of stamina due to the stress on joints and feet.

### ***Instability door***

The weakness of the ligaments and muscles that support the base of the skull and cervical spine may lead to instability of the door. Without the help kinesiotherapy, vertebrae within the cervical spine can slip and cause pressure on the spinal cord, leading to pain, weakness and poor coordination.

### ***Learning benefits***

Kinesiotherapy provides more than corrective steps to increase muscle strength; it literally teaches children how to learn. Integration therapy in the child's daily routine, parents have the opportunity to understand how their child learns, what methods work best and how to do it entertaining. It can improve a child's success in overcoming the challenges of language, education and social skills that are waiting for him, not to mention facilitating the fulfillment of its potential.

Repeat Kinesiotherapy helps teach and empower gross motor skills through daily repetition. Perseverance is essential for success. Results of therapy is not reflected from one day to another, but rather over an extended period.

### **4.1. The aim of kinesiotherapy**

Before you set goals kinesiotherapy for children with Down syndrome, it is first necessary to understand what is not the goal. The aim kinesiotherapy not accelerate the rate of development of gross motor. The rate of development of gross motor skills in children with Down syndrome is influenced by many factors, including hypotonia, ligament laxity, reduced power and short arms and legs. These factors are certain genetics, although some may be influenced kinesiotherapy can not be fundamentally changed.

Children with Down syndrome are trying to compensate for his hypotonia, ligament laxity, reduced power and short limbs develop compensatory movement patterns that, if you sustain, often develop in orthopedic and functional problems.

Kinesiotherapy objective is to minimize the development of compensatory movement patterns that children with Down syndrome tend to develop.

Stroke is the primary goal. Ligament laxity, hypotonia and weakness in the legs leads to a weaker possession of abductions and external rotation of the hip, knee and hyperexten- pronation and eversion of the foot. Children with Down syndrome usually learn to walk with your feet wide apart, stiff knees and feet pointing outwards. They are doing so because of hypotonia, ligament laxity and weaknesses, their legs are less stable. Strategies for increasing the stability of the knee are fixing their, expanding their base and rotate the feet inward. The problem, however, is that it is an ineffective form of holding in walking. The weight is transferred to the medial (inner) edge of the foot, and the feet are designed to bear weight on the outer edges. If this pattern continues, there will be problems with the knees and the feet. Walking becomes painful, and stamina will be reduced. Kinesiotherapy to start teaching a child with Down syndrome proper standing posture (ie. Feet placed hip and outcome focused straight ahead with slightly bent knees) while he was still a little kid. With a suitable kinetic therapy, problems with walking can be minimized or avoided.

The position of the body is another example. Ligament laxity, hypotonia and decreased strength in the hull of encouraging the development of kyphosis, which is often first noticed when the child learns to sit. Children with Down syndrome usually learn to sit down with the posterior slope of the pelvis, rounded body and head resting back on his shoulders. Never learn to actively move your pelvis to a vertical (upright) position, and therefore, can not hold his head and torso over her. If this position continues, will ultimately result in a more difficult breathing and reduced ability to rotate troops. Kinesiotherapy must teach the child proper Postur, sitting by offering support at the appropriate level, even before



the child is able to sit independently. First, the therapist provides support for the upper torso, then the middle part of the fuselage, and between the shoulders and waist, and the waist and finally the pelvis. Support is provided on each level keeps the spine and pelvis in the correct plane until the child develop a force that can only hold the segment in the plane. Proper kinesiotherapy can minimize problems related to posture forces.

Kinesiotherapy should:

- be focused on the long-term functioning of the child
- be used to minimize the development of compensatory movement patterns
- be based on a comprehensive understanding of the compensatory movement patterns that children with Down syndrome tend to
- be strategically designed to proactively build strength of certain muscle groups so your child develop optimal movement patterns
- focus on gait, posture, and the exercise.

#### **4. Conclusion**

Early kinetic therapy in children with Down syndrome focuses on the problems of hypotonia, ligament laxity, and delayed motor development. The emphasis is on overcoming weaknesses and Learning Gross Motor Skills. Kinesiotherapy will not solve the problem, development will continue to be slow. But it will help minimize the development of abnormal forms of compensatory behavior. Toppling over, sitting, crawling and walking will eventually happen. But with kinetic therapy happens to correct postural and solid foundations. When one starts with kinesiotherapy would be best to continue to maintain the achieved physical abilities through childhood and life. Preventing problems with bones, ligaments and muscles related to the year becomes increasingly more important.

Kinesiotherapy can help people with Down syndrome to live a better quality of life. Kinesiotherapy is often omitted in the earliest treatments until you do a lot of damage. Children are left with their weaknesses, strange behaviors and deformations that are allowed to happen. If you start early enough with kinesiotherapy, the child will have a much healthier life.

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