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## Improving a Child with Down's Syndrome Using Therapeutic Methods (Including Shantala Special Care Massage, Sensory Integration). A Case Study

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*Doskonalenie dziecka z zespołem Downa metodami terapeutycznymi (w tym masażem Shantala Special Care, integracją sensoryczną). Studium przypadku*

**Abstract.** The article indicates the most common genetic causes of Down's syndrome, as well as typical differences in physical structure and motor, intellectual and communication limitations occurring in people with Down's syndrome compared to non-disabled people (children). On the example of a girl with the syndrome mentioned above, the therapeutic measures taken in the field of physiotherapy, sensory integration and speech therapy, which led to the improvement of her functioning and the quality of her life, were described. The need to involve the girl's parents in therapeutic activities by involving the child in self-service and home activities in order to increase the effectiveness of therapy and give it a practical dimension was emphasized.

**Keywords:** Down syndrome; case study; sensory integration; Shantala Special Care Massage

**Abstrakt.** W artykule wskazano najczęstsze genetyczne przyczyny występowania zespołu Downa, a także typowe różnice w budowie fizycznej oraz ograniczenia motoryczne, intelektualne i komunikacyjne występujące u osób z zespołem Downa w porównaniu z osobami (dziećmi) pełnosprawnymi. Na przykładzie dziewczynki ze wspomnianym syndromem, po uprzednim przedstawieniu epikryzy, opisano podjęte działania terapeutyczne z zakresu fizjoterapii, integracji sensorycznej i logopedii, które doprowadziły do poprawy jej funkcjonowania i jakości jej życia. Zwrócono uwagę na konieczność włączenia rodziców dziewczynki do działań terapeutycznych poprzez angażowanie dziecka do wykonywania czynności samoobsługowych i domowych w celu podniesienia skuteczności terapii i nadania jej praktycznego wymiaru.

**Słowa kluczowe:** zespół Downa; studium przypadku; integracja sensoryczna; masaż Shantala Special Care

Caring for the child is the first and basic test of  
a person's attitude towards a person.

(John Paul II)

Down's syndrome is not a disease, but a natural  
form of human existence with a different course  
of development than the genetic majority with 46 chromosomes.

(Alina Midro)

## INTRODUCTION

Down's syndrome is one of the most typical forms of intellectual disability. It is a genetically determined disorder, occurring in three varieties: trisomy, translocation, mosaic, of which the most common is trisomy of 21 chromosome pairs (Fuh et al. 1992; Le Gal La Salle et al. 1993). Due to changes in the chromosome complement, the cells may manifest their developmental deficits in many areas (multiple malformations, ranging from the characteristic physical structure imbalance syndrome to the development of speech and thinking, and consequently social functioning).

The genetic information contained in DNA chains is a "recipe for man". It happens that during the division of germ cells an unequal division of chromosomes occurs, which often results in an excess of genetic material in chromosome 21 (Midro 2008), which is the smallest of the group of autosomal chromosomes (i.e. inheriting features not related to sex). As mentioned above, chromosome 21 trisomy is the most common cause of Down's syndrome. We talk about trisomy if there is a third chromatid in addition to the standard chromatid pair. This is described in the karyotype of people with Down's syndrome as follows: 47,XX,+21 in girls, 47,XY,+21 in boys. The cause of trisomy is the abnormal separation of chromosomes during the first or second meiotic division. Molecular tests carried out by Korenberg introduced a precise location of the so-called critical region in Down's syndrome "in the distal part of the long arm of the chromosome 21 stria 21q22. Within this region the genes responsible for the formation of characteristic phenotypic features of the syndrome, the most common congenital defects and increased production of many proteins, which are one of the causes of premature apoptosis in the central nervous system and parenchymal organs" (Sadowska 2004, p. 9).

Chromosome 21 is included in group G (in humans we distinguish seven groups plus X and Y sex chromosomes) of acrocentric and small chromosomes, which determines later mental development, intelligence, muscle tension, flexibility of joint cartilage and tendons. The genetic information contained in chromosome 21 translates into the flexibility of joints, body height and proportion between torso and limbs, proportions

of the skull and somatic development of the heart, genital organs, pelvis, epicanthic fold of the eye, iris, lens, phalanges, dermatological patterns of feet, hands, lateral sinuses of the nose, shape of the auricle, quality and quantity of hair, size of teeth, and thickness of brain bones of the skull (Roberts 1993; Sarikova 1998; Sadowska, Mysłek-Prucnal, Mazur 2009). In Down's syndrome, characteristic dysmorphic features can be distinguished. The head is small, flattened in the occipital part, shortened anteriorly and posteriorly, smooth, rare and straight hair. Children's face is flat and round, their nose is small, short, flat with a wide base. Their eyes are oblique and the eyelid crevices are narrow. On the iris of the eye, there are Brushfield spots, hypertelorism (increased distance between eyes than typical). The palate is gothic. The limbs are short, the hands and feet wide with a palm and sandal furrow (respectively) (Mazurczak 1990; Sadowska, Mysłek-Prucnal, Mazur 2009). People with Down's syndrome often have an abnormal occlusion associated with general weak muscle tension – weak tongue muscle tension, the mentioned gothic palate and often limited intellectual capacity, which results in various communication problems requiring logopedic intervention.

The characteristic external features of people affected by the previously unknown disease were described by an eminent 19<sup>th</sup>-century physician John Langdon Down, hence the eponym of the syndrome.

## A CHILD CASE STUDY

### 1. The child's medical epicurea – extract

Marysia was born in the 39<sup>th</sup> week of pregnancy. She weighed 3,465 g, was 55 cm long, head circumference was 34 cm. She received 10 points on the Apgar score. She was observed as an abnormality, reduced muscle tension and all dysmorphic features that characterize a child with Down's syndrome. The recommendations state that the newborn requires the care of a specialist clinic. According to the cardiological examination performed in 2015 (at that time the girl was one month old), atrioventricular binding and venous flows to the atria were normal. The aortic arch was normal. Heart dimensions and contractility were normal. There was no loss in the heart septum. Doppler examination showed normal valvular flow. There were no signs of a heart defect or cardiomyopathy. The physiological advantage of the right ventricular was found, and the ophthalmologic examination revealed hyperopia.

### 2. Description of the child

Marysia came to me at the age of three, but her therapy is still ongoing. To diagnose the problems that occurred in Marysia at that time, I used the Munich Functional Developmental Diagnostic Questionnaire for children aged three years. This study

allowed me to obtain an assessment of her social maturity, locomotion, development of perception, independence. At that time, the girl had problems with balance, stopping on one leg, jumping on one side, jumping on one leg. Her gait was very stiff, on a wide base. She climbed the staircase with a child's step, getting her foot on the foot, not an alternate step typical to her developmental age. She had a disturbed assessment of the distance, which became apparent when throwing the bag into the basket from a distance of 50 cm. Marysia was afraid to walk on uneven surfaces, because it was a problem. She also didn't like to exercise on the ball, and she didn't want to go on swings because she felt discomfort, so she reacted by crying. Sitting on the floor, she took a W-shaped sitting position. While sitting in the cross-legged seat, you could see the pelvis tilt and the girl was sitting on her tailbone. The arms were placed in the protraction, which limited the chest's mobility. Her head was pushing forward with her mouth open at the same time. She was drooling, speaking very blurry. While walking, a knee bend was noticeable, as well as a forward tilt of the torso, which indicated a pelvic anterior tilt when taking a standing position, which resulted in abnormal dissociation in shoulder and hip rims and problems with isolated eye movements.

The tests showed that the girl has increased joint mobility, otherwise known as joint hypomobility. This term was first used in 1967 by Kirk, Ansel and Bywaters. According to Stodolny, joint hypomobility is caused by a generalized, spontaneous, congenital failure of the connective tissue of the whole body. It is manifested by flaccidity of bags and ligaments stabilizing the joints, increased in relation to the norm by the range of movements in the joints. The reason for hypomobility is also a reduced muscle tension, which consequently contributes to tactile hyperactivity, balance problems, and disorders in the area of small and large motor skills, as well as deep sensation disorders. All of these elements make up the picture of abnormal sensory integration within the touch. The conversion of static motion into dynamic and vice versa was the problem for Marysia. There were problems with the correct distribution of muscle tension in the proximal part, manifested by low muscle tension in the center and increased in the upper and lower limbs. The dissociation between the shoulder and hip rim was abnormal, which made the girl unable to grasp and hold the object with both hands.

### **3. Therapeutic actions taken in the field of hand therapy, sensory integration and Shantala massage**

In order to improve sensory processing in the sense of touch, strengthen muscle tension, correct posture, I focused on performing exercises in lying positions. Before performing the main exercises, I did exercises with Marysia that relaxed tense muscle groups, including the tibial and shaving area. Only after preparing the child's body in this way the child could move on to performing the main exercises. In my work with Marysia, I started with isometric exercises in lying on the back. Then the child would do the exercises in a standing position, and I would pay attention to the proper carrying

of the body weight and maintaining balance. I used for this: carrying trays, plates, balls. The purpose of the exercises was to stabilise the shoulder blade and rim better and to improve the mobility of the distal parts of the body. The exercises improved facial muscles, which made the face closed and the jaw set in an intermediate position. During the classes, the girl's task was also to walk on the marked places. She had to stop with her foot drawn on the floor, holding a balloon in her hands. While performing the exercise by the child I paid attention to the rotation in the hip rim. It was also important for the girl to maintain an appropriate pace and rhythm, which improved the rolling of her foot. Marysia started to position her foot from the heel and then carried the weight on the whole foot. In this way, she also developed a balance during the movement. In addition, the exercise deepened the girl's ability to differentiate the sides of her body both in the upper and lower limbs. In this way, dissociation of the shoulder and hip rim was improved. While walking Marysia had to say which leg is in front and which hand is on top of the balloon. Then we practiced beating the slalom. There were bollards on the floor, Marysia held a balloon in her hands, at chest level, her hands were slightly bent in the elbow joints. This caused the neck to be visible, the lower shoulder blade angle to descend to the spine line, which in consequence contributed to the strengthening of postural muscles and the shoulder girdle. In order to improve the assessment of the distance, I recommended performing exercises, which were some homework such as: helping to set up vessels, pouring liquids into a glass, wiping dust from their shelves. These works forced a full range of movement in the joints. At the same time, these exercises were also graphomotor exercises, because there was a movement from the inside to the outside, which we do while writing, painting, drawing.




In order to improve the muscle tension, to change the position of the centre of gravity, to perform rotation in the thoracic section of the spine I used elements of dance while playing. Thanks to this, I shaped the balance. The aim of all these games was to stimulate deep (proprioceptive), atrial feeling. As a result, I achieved an improvement in the girl's body pattern. "Self-feeling" is important for the functioning of a child with Down's syndrome because it increases his or her self-service capabilities. According to Schilder (1936), the body pattern is closely related to muscle tonus, posture and tactile sensations. It shows that having an image of one's body is necessary for every movement (Schilder 1942). The memory of the body pattern is a global awareness of position in the inter-sensory world (Sheets-Johnstone 2011). By stimulating the body's center of gravity, a body pattern is formed, the body's centerline. The rotation in the thoracic section of the spine is extremely important for crossing the body's centerline. According to the concept of sensory integration, it is the ability of eyes, arms, legs and head to move during which the middle regions of the body are crossed (Cermak 1980; Maas 1998; Sheets-Johnstone 2011; Cermak, Ayres 1984). The following muscle groups are responsible for this: erector spinae; lower back muscles, stabilizing the pelvis, internal and external transverse abdominal muscles – they work in combination with torso rotation and lateral inclinations, transverse abdominis; lower abdominal


muscles run across the abdomen, also provide pelvic stability and rectus abdominis – they form the main abdominal muscles and enable the body to bend down. All of them together allow a wide range of movements in the middle part of the body, also giving stability to the spine and pelvis (Szmalec, Binkuńska 2014).

#### 4. The role of the family – working with a child outside the therapeutic office

In the multi-profile improvement of a girl, the parents play an important role, because they are the ones who, through proper parental care, lay the foundations for the proper mental health of the child at an early stage of life (Olechnowicz 1999). Therefore, it is very important for the child to perform the therapist’s recommended home exercises, such as Shantala Special Care massage that “its positive effect was also demonstrated (...) in children with cerebral palsy and Down’s syndrome” (Zagórska 2013) or hand therapy, within the family. Table 1 shows examples of exercises.

Table 1. Exercises in hand therapy

Exercise proposition	Execution	Impact
<p>1. Eraser on the back Starting position: lie on your back, your hands are holding your knees bent on the outside. We tell the child that he or she is an eraser and will now have to rub the wrong word. We ask the child to make alternate movements of the shoulder rim and hips Number of repetitions: 1 hold on 30 seconds</p>		<p>Relaxation of spinal muscles, tibial and shaving groups</p>
<p>2. Bicycle crunch Starting position: lying on the back. We ask the child to make a bicycle back with his or her legs and the mill’s hands back. Head and back are sticking to the ground Number of repetitions: 4 every 4 seconds</p>		<p>Strengthening of shoulder muscles, development of dissociation in shoulder and hip girdle</p>
<p>3. The kitten shows her paws Starting position: sit down sideways, please push hard on the ground with both hands Number of repetitions: 4 times 5 seconds each</p>		<p>Strengthening postural muscles, including facial muscles, strengthening the muscles of the shoulder rim</p>

Exercise proposition	Execution	Impact
<p>4. Accolade                      Starting position: one-knife kneeling. We ask the child to slowly stand up from the fear of the one-knife and take up a standing position                      Number of repetitions: 4 times per side</p>		<p>Shaping the correct posture, preventing knee bowing, strengthening the dorsal and chest muscles, exercising short feet, exercising facial muscles and tongue elevation</p>

Source: (Szmalec, Wszyński 2019).

Additional exercises that parents with a child can do are as follows:

1. Playing balloon bouncing.
2. Pulling the rope. In this game, the parent remembers that the rope is at the height of the swordfish appendix.
3. Dragging the towel or blanket.
4. Walking on all fours, going through tunnels.
5. Housekeeping, washing your mug, plate.
6. Getting to the top. A parent going out with his child can take a rope with him, then he can tie a rope around the tree. The child's task is to climb a hill, the child has to climb to the top of the hill with the rope.
7. Walking with Nordic Walking poles.

## LOGO-PEDAGOGICAL INTERVENTION

### 1. Speech development analysis – introduction

The various aspects of speech, i.e. passive speech – understanding the language, as well as its broadcasting – active speech – concerning the functioning of all levels of language: syntax, vocabulary, inflection, semantics and, finally, phonetics and phonology are connected by a specific way of functioning, as well as by the maturity of the central nervous system, peripheral nervous system and speech organs.

In the case of people with Down's syndrome, especially with early speech therapy, the aim of which is to achieve the highest possible level of communication improve-

ment, understanding of the language, as well as the ability to communicate one's needs speech development reaches a level sufficient for the needs of efficient communication in everyday situations (Szmalec, Binkuńska 2014).

The level of development of particular aspects of language can reach developmental stages allowing for effective communication, therefore it is important to stimulate the communicative skills of each of the language layers. In cases of non-self-contained delayed development of speech in terms of syntax, the communicative ability may be stopped at the stage of using simple or complex sentences, including many times with a dominant specific type of pronoun "i" and possibly "a". In this situation, stimulating the development of communication skills will include, among other things, the creation of information – in the form of sentences – concerning cause-and-effect relations or e.g. informing about exclusion or opposite features present in the described situation, relation, phenomenon.

Agrammatisms concerning both vocabulary and inflection are a feature that occurs in the development of children's speech, there are also cases of communication of persons with various deficits in verbal communication. In this situation, it is advisable both to develop the use of lexical elements in various grammatical forms (basic, augmentative, etc.) and to develop the skills of using declination and conjugation not only by analogy to the mastered basic patterns of the variety, but also within words whose variety paradigm is less typical, or certain grammatical forms in general speech seem to be less popular. This is mainly the case with words that actually occur in everyday speech.

The articulation layer is another element that proves communication efficiency. In the case of Down's syndrome, disturbances in this area may concern both the number of pronounced sounds (thus they take the form of parallels) as well as the quality of sounds (i.e. their deformation).

The limited number of sounds is a result of lower motor skills of the language in particular, which may be accompanied by reduced muscular tension, and the so-called macroglossary, characteristic for this syndrome, should be taken into account. The effect of such functioning of speech organs may be the lack of verticalisation of the tongue, in this situation the correct realization of sounds [l], [r], and [š], [ž], [č], [ž] – whose correct creation in Polish depends on the elevation of the anterior part of the tongue together with an apex to the hard palate and gingival shaft – becomes impossible.

Weak muscle tension occurring within the tongue (Jęczmień 2012) also affects other groups of facial muscles, including the circular muscle of the mouth and individual cheek muscles, such as: yoke muscles larger and smaller, rumen or cheek muscle. A characteristic feature of the muscle weakness occurring in the circular muscle of the mouth is keeping the mouth open at rest. On the other hand, open mouths in a habitual way are accompanied by resting breathing on the oral track (Mitrinowicz-Modrzejewska 1963; Zielińska 2002). Such breathing is a symptom of pathological functioning of speech organs (Rządźka 2011). In terms of articulation, resting mouth breathing is accompanied by deformations of sounds, e.g. voices [t], [d], [n], [l], [s], [z], [c]. It



also happens that the oral track breathing is accompanied by the so-called infantile (immature) way of swallowing food – in this situation, the mass of the tongue during the swallowing phase is not lifted to the upper gums and palate, but performs a prior flat motion, often towards the tooth line (Proffit, Fields 2001).

The anatomical and physiological characteristics of the speech organs form the basis of the process of giving the language – they determine, among other things, the quality of speech. Thus, taking into account the functioning of articulatory organs, the following features are distinguished as accompanying features of Down's syndrome: reduced muscular tension of the tongue and the other groups of facial muscles involved in the formation of speech, the previously mentioned breathing on the oral track at rest, shallow breathing, which does not allow the optimal use of lung capacity during the oxygen exchange process, infantile swallowing, but also abnormal sucking pattern occurring in the neonatal and infant period.

Speech formation disorders resulting from physiological features of people with Down's syndrome may also take the form of impediments occurring already at the stage of the phonation process and taking the form of reduced respiratory-phonographic-articulatory coordination. Such a situation is conditioned by "limited stability of the shoulder girdle with pathological conduction and shoulder straightening, hence they often have big problems with coordination of breathing in phonation and speech. Lung capacity is limited not only by the degree of development of the abdominal and shoulder strap muscles but also by the pathological extension of the tongue, limiting air flow through the mouth and nose. The child compensates for these deficiencies by pushing the tongue forward towards the hard palate" (Kaczan, Śmigiel 2012).

Taking into account the structure of articulatory organs, in persons with Down's syndrome, malocclusions can be observed, including, for example, anterior open bite and pseudo-overbite. The spacing of teeth is also specific. There are larger gaps between the individual teeth. The narrow palate is also important for the way speech is performed. On the other hand, the quality of voice may be determined by the reduced space of the paranasal sinuses.

#### SPEECH DEVELOPMENT. CASE STUDY

In this case, a girl with Down's syndrome has been stimulated from a very early age. At the age of eight, speech reception is developed satisfactorily. The therapeutic work related to speech perception is primarily concerned with developing the ability to use the acquired knowledge/information after some time and to consolidate it. This requires repeating massages with the child. In terms of inflection and syntax, errors occur in the speech of the child.

On the other hand, the articulation of the girl has improved the utterance of sounds such as [d] – [t], [b] – [p]. Substitutions are conditioned in this case by better motor

skills of the language, which in effect is connected with its verticalisation. The work of the circular muscles of the mouth and face has also improved. The girl's face is closed (Szmalec, Binkuńska 2014).

## RECOMMENDATIONS FOR FURTHER LOGOPEDIC THERAPY

Recommendations for logopedic therapy are linked to the development of specific language aspects. The development of communication skills should take into account both message reception and speech expression. The child's passive and active vocabulary should be developed in this respect. Efficient communication also serves to make clear the important role of taking care of the correct construction of messages in terms of sentence creation, the grammatical correctness of whole units such as expressions and phrases, but also in the use of single lexes in their correct grammatical form.

The emphasis should be placed on the therapy of articulation disorders and the associated speech organ abnormalities. First of all, a proper respiratory tract at rest should be developed and fixed (Binkuńska 2012). In this case, the exercises focus on air intake through the nose and release through the oral cavity. Such stimulation of the ability to keep the oral cavity closed during the inhalation phase is an active stimulus for the muscular system, being at the same time a model for the desired condition of speech organs.

In the case of both resting mouth breathing and a tendency for interdental arrangement of the tongue mass, it is also worth noting the way of swallowing (Mackiewicz 1983). The optimal situation is to maintain the anterior part of the tongue over the upper gums, gingival shaft and hard palate during the swallowing phase (Pluta-Wojciechowska 2010). If the mass of the tongue is in the swallowing phase below or slipped between the teeth, it indicates the so-called infantile swallowing, which is a reflection of the durable infantile swallowing. In this situation, logopedic therapy also includes exercises in swallowing functions.

Keeping the mouth closed is also supported by both passive and active therapeutic effects. In an active way, the actions take place by including exercises of articulator muscles – circular mouth and other groups of cheek muscles. For example, Shantala Special Care massages are used in this case, where the exercises performed will affect the collection of lips forward and stretch them alternately, moving the collected lips to the right and left and up and down, or performing circular movements of the collected lips forward. In case of weakening of muscle tension, in addition to exercises aimed at improving it within the lips, cheek muscles are also exercised. For example, air can be taken into the spaces between the gums and teeth and cheeks and stopped for a few seconds with the lips clenched or air can be taken from one side of the mouth and moved to the other so as not to move the clenched lips. In addition to the above-mentioned exercises, the muscular tension of the facial space can be reinforced by using Shantala Special Care face massage (Masgutowa, Regner 2009; Stecko 2012).

Table 2. Instructions for Shantala Special Care face massage

Stimulation type	Participating muscles	Position	Position function
1. Massage starts from the frontal area, then the hand leads to the temporal area, mandibular-temporal joint and the chin. We perform stroking movements and at the same time we rub with the fingertips or the whole palm of the right and left hand	Both sides of the tendon cap	Both sides of the tendon cap, cartilage of the auricle	Muscle contraction causes transverse wrinkles on the forehead, giving expression to the face
2. Massage with the thumb pads of the eyebrow and dorsal side of the nose	Circular eye muscle	Orbital part (the strongest circumferentially located around the entrance to the orbit overlaps the cut and cheek)	The orbit clenches the eyelids, pulling the eyebrows medially and downwards
			The eyelid section contains the eyelid crevice (blinking)
			The tear part opens the tear bag
	Eyebrow frowning muscle	Eyelid section (located centrally from the previous one and its fibres run in both eyelids)	It produces 2-3 folds between the eyebrows
The tear part (the smallest one deepest back from the tear sack)			
It's next to the nasal root from where it runs to the eyebrow skin			
	Oblong muscle	Situated in the intercostal region	It causes lateral folds at the base of the nose
3. Stroking with the fingertips of the cheek area, direction from the eyeballs to the chin and from the nose to the sides to the mandible	Nasal muscle	It starts at the jaw at the level of the canine and lateral incisor, transversal part (runs fan-shaped to the back of the nose)	The lateral part narrows the nostril
		Winged part (side-rear nose wing edge)	The wing part opens the nostrils
	Partition reducer muscle	From the height of the lateral maxillary incisor, the membranous part of the nasal septum	He pulls the baffle back

Stimulation type	Participating muscles	Position	Position function	
	Rumenus muscle	Yoke bone, yoke bow, lateral surface of lower mandibular branches, mandibular angle	It interacts with the temporal muscle in lifting and rotating the mandible outwards It takes part in extending the mandible forwards	
	Muscles larger and smaller	Runs from the area of the yoke bone, Larger ends near the mouth corner, Smaller reaches the skin of the nasolabial furrow	He pulls his upper lip up and to the side	
4. The right and left thumbs are used to stroke the mandible, the circular muscles of the mouth, the papillary muscle	Mouth circular muscle	Coastal part (closer to the mouthpiece), labial (located peripherally)	Coastal part (narrows down lip red and returns lips to the outside)	
	Papillary muscle	Splitting medially from the previous muscle	Labial part (shrinkage of this part widens the labial red and rolls out his lips when he whistles or kisses)	
	Depressor anguli oris	Flat triangular. It extends from the mandible to the mouth corner	It conveys the beard and gives the face a sulking expression. Its contraction lowers the angle of the mouth giving the face an expression of sadness or distress	
	Medial pterygoid	The winged bottom of the wedge bone and the adjacent small section of the palatine and maxillary bone	It interacts with the temporal muscle and rumen	
	Lateral pterygoid	Upper head (subtemporal wing of the larger wedge bone)	Lower head (lateral surface of the winged appendix and subtemporal surface of the jaw)	The bilateral contraction extends the mandible forward
		Wing tip of the condylar process of the mandible		
	Temporomandibular joint capsule		Unilateral contraction twists the mandible inwards	

Source: own elaboration.

In the case in question, people with Down's syndrome, articulator's exercises also concern the ability to lift the front part of the tongue mass to the hard palate (Skorek 2003) and the gingival shaft.

Breath deepening exercises play an important role in people with Down's syndrome. Their aim is not only to quantify the gas exchange, but also to activate individual parts of the chest muscles, with particular attention paid to the way of breathing in which the abdominal muscles – including the diaphragm – will be active. The effect of deepening the breath will be to obtain an extension of the expiratory phase, which is important for improving the quality of speech and obtaining respiratory support – this, in turn, forms the basis for work on the quality of the resulting speech sounds.

Another element of logopedic therapy is breathing and phonation exercises. In this case, they are not only important in the context of work on the quality of voice, but also play a role in the therapy of speech without sound, which occurs in a girl.

These groups of exercises concerning both the way of breathing and muscle tension and motor skills of the lips, cheeks and tongue are the basis for obtaining and recording correct speech sounds in the case of deformed and pronounced sounds in an interdental position, but also the case of voice substitution and emerging grailials.

The child's speech is soundless, but also the aforementioned tendency to skip speech sounds (grailials) is the basis for the implementation of auditory exercises in the therapeutic work, with attention paid to phonematic hearing exercises and the ability to differentiate sounds that differ in one distinctive feature. Logopedic therapy in the case of speech without sound also includes phonation exercises and respiratory-phono-articulatory coordination.

## CONCLUSIONS

Intensive sensory stimulation, speech therapy, hand therapy, contributed to the better functioning of Marysia at home and school. After several years of working with the child, I performed tests of sensory integration, which showed an improvement in the differentiation of right-left, bilateral motor coordination, mimicry. The improvement was found by comparing the tests from sensory integration, which were carried out in September in a psychological-educational clinic located in the Pomeranian Voivodeship. A sensomotor questionnaire was also performed, on the basis of which Marysia observed normalization in the sphere of touch. The girl is not disturbed when unexpectedly touched, she no longer avoids activities related to finger painting or plasticine sticking. A long questionnaire (Szmalec, Wszyński 2019) for graphomotrics by Szmalec was also made. The results obtained from the questionnaire indicate improvement in the area of postural tension, work of the shoulder rim. There are no problems with manipulation: cutting, learning new movement sequences faster. This has affected the results obtained by the girl at school. From the descrip-

tive interim evaluation: she works at a slow pace, finishes the work she started. She is always prepared for the lesson and can work in a team. She answers the question correctly constructed simple sentences. She reads correctly, at a good pace, previously prepared texts. She understands the text she is reading, correctly reproduces the shapes of letters, tries to keep their proportions, and combines them properly. Written and printed text usually rewrites at a slow speed without any mistakes. During art classes, she performs interesting and aesthetic works. She willingly participates in games and sports, follows the rules of games.

The work with the girl, carried out by therapists and parents, brought tangible results, which were reflected in her functioning at school and home. At school, the girl is liked, quickly establishes contacts, actively participates in artistic performances organized by the class teacher, willingly participates in physical education lessons, organized plays on the school premises. She quickly learns lyrics of songs, carols and rhymes, which she declares at school ceremonies. At home, she actively helps with household chores related to self-service, including assistance in preparing meals as well as cleaning classes, washing, arranging kitchen utensils in cabinets, sorting cutlery, transplanting ornamental plants. She tries to knead the dough, rolls it out. She learns how to actively use household equipment and its purpose. She knows the use of the mixer, can turn it on or off, set the appropriate frequency. She uses the mixer to prepare whipped cream or pancake dough. In this way, she provides herself with tactile sensory stimuli, normalizing muscle tension in the upper limbs. Vibration relaxes the grip of the drawing instrument which is too strong. While doing her homework, she perfects the following grips: hook, hammer, pincer, tweezer, spherical, which she uses in her everyday life. So everything that is used in therapy is also used in the girl's functional life.

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