EFFECTS OF INSTRUMENTAL FACIAL MASSAGE AND NEUROMOTOR STIMULATION TECHNIQUES IN CHILDREN WITH CEREBRAL PALSY

Dana MARIN[1*], Ilie ONU[2], Ana ONU[3]

[1] National University of Physical Education and Sport, Faculty of Physical Therapy, Bucharest, Romania
[2] University of Medicine and Pharmacy "Grigore T. Popa", Faculty of Medical Bioengineering, Iași, Romania
[3] Elipetro Med Clinic, Piatra Neamț, Romania
*Corresponding author: dana_marin30@yahoo.com

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Abstract. *Mastication and swallowing disorders as well as the presence of sialorrhea are some of the severe consequences that often accompany motor disorders in children with cerebral palsy. The purpose of this study is to investigate the impact of applying instrumental facial massage procedures and neuromotor stimulation techniques on orofacial muscles and structures and global motor control in order to improve oral motor functions (mastication and swallowing), reduce sialorrhea and increase the level of motor development. The present study included 10 participants (6 girls and 4 boys) aged 8-10 years diagnosed with cerebral palsy, spastic tetraplegia form with severe orofacial dysfunction. Children were assessed to determine their level of neuromotor development using the GMFCS (Gross Motor Function Classification System) Scale, muscle tone (pathological hypertonia) by means of the Modified Ashworth Scale, mastication and swallowing impairments through the Likert Scale, and sialorrhea using the Thomas-Stonell and Greenberg Scale. The research participants were applied a programme consisting of instrumental facial massage procedures and neuromotor stimulation techniques performed 4 times a week. Statistical results highlighted that the application of instrumental facial massage procedures and neuromotor stimulation techniques within the classic protocol for the rehabilitation of children with cerebral palsy proved to be effective in the case of the 10 participants, their scores improving at the end of the research compared to those recorded at the beginning of the study.*

Keywords: *cerebral palsy; orofacial dysfunction; instrumental facial massage; sialorrhea.*

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Introduction

Cerebral palsy (CP) is the most common neurological disorder of childhood, affecting thousands of children each year. This disability results from irreversible damage to the developing brain of the foetus or infant, which causes motor and body posture disorders that are often accompanied by cognitive or sensory difficulties (Ali et al., 2019) as well as feeding- and speech-related disorders (Novak et al., 2012).

Despite the progress made in the prevention and treatment of cerebral palsy, the percentage of babies who develop this pathology has remained constant in recent years according to the

Centres for Disease Control and Prevention (2022), which requires additional research efforts to prevent the occurrence of this disability.

The overall rate of cerebral palsy for the period 1980-1990 was 2.08 per 1,000 live births, but in the case of premature babies with a birth weight less than 1,500 g, the rate was 70 times higher compared to infants weighing 2,500 g or more at birth (Arnaud et al., 2018).

Epidemiological studies conducted over the last decades in developed countries report an increased prevalence of cerebral palsy especially among infants with low and very low birth weight (Blair et al., 2019). After analysing the correlation between the prevalence of cerebral palsy, gestational age and birth weight, a significant increase in CP cases was revealed for infants born below 32 weeks of gestation, whose birth weight was less than 1,500 g (Van Naarden Braun et al., 2016).

Involuntary loss of saliva caused by difficulty keeping it in the oral cavity is a common problem for children with cerebral palsy. The inability to retain saliva within the mouth, also known as sialorrhea, is due to poor head and lip control, disorganised tongue mobility, constant open mouth, or decreased tactile sensations (Bavikatte et al., 2012).

As regards mastication and swallowing impairments that often accompany postural imbalances in children with cerebral palsy, they are associated with poor growth (Brooks et al., 2011) and can compromise respiratory capacity. According to Gibson et al. (2021), secondary respiratory diseases are the leading cause of mortality in young people with CP.

A severe consequence of feeding disorders is malnutrition (Almuneef, 2019), which has been considered a major problem worldwide. The study by Dahlseng et al. (2012) revealed that only 63% of children with cerebral palsy had normal body mass index, 16% were overweight or obese, and 20% were underweight (with severe forms for some of them).

Several studies report high prevalence of orofacial dysfunction in children with CP, for example, 39% to 85% have difficulty with eating (mastication and swallowing) (Reid et al., 2012), 22% to 40% with controlling saliva (sialorrhea is present) (Parkes et al., 2010), and 53% to 59% with talking (Novak et al., 2012; Nordberg et al., 2013). Thus, dysfunction in the face, tongue, palate and throat (generically termed orofacial dysfunction) has a strong impact on the health of children with cerebral palsy (Edvinsson & Lunqvist, 2016).

Mastication and swallowing impairments as well as hypersalivation (excessive drooling) cause distress and affliction to both children and their parents and caregivers due to the discomfort created by masticatory and speech problems, bad-smelling breath, skin irritations, orofacial infections, and dehydration, which unfortunately lead to the social isolation of these children (Van der Burg et al., 2006).

Therefore, the *purpose* of this study is to investigate the impact of applying instrumental facial massage procedures and neuromotor stimulation techniques on orofacial muscles and structures and global motor control in order to improve oral motor functions (mastication and swallowing), reduce sialorrhea and increase the level of motor development within the classic protocol for the rehabilitation of children with cerebral palsy.

Methodology

Participants

The study was conducted at the Elena Căciulan Fizioclinique Rehabilitation Centre in Bucharest from January 2022 to March 2023 and included 10 participants (6 girls and 4 boys) aged 8-10 years diagnosed with cerebral palsy, spastic tetraplegia form with severe orofacial dysfunction. For each child in the study group, a participation agreement was drawn up, which was signed by the caregivers.

Inclusion criteria: severe orofacial impairment with the presence of sialorrhea, as well as mastication and swallowing disorders; resident of Bucharest; possibility to participate in the physiotherapy programme 4 times a week.

Exclusion criteria: mental retardation; previous seizures in the medical history; associated diseases.

Physiotherapy sessions lasted 45 minutes each and the principle of progression was respected, meaning that a small number of repetitions were performed in the first 10-15 sessions, which progressively increased depending on the degree of acceptance of instrumental facial massage procedures and neuromotor stimulation techniques by the study participants. All children performed daily posture exercises at home (in a stander device and in night splints) and instrumental facial massage (using the purchased facial massage device that was recommended to them).

Assessment methods

The research participants were tested in dynamic conditions both initially, at the beginning of the kinetic and orofacial education programme, and finally, after 7 months of specific therapy, because progress is slow for the child with CP throughout the rehabilitation process.

Children were assessed to determine their level of neuromotor development using the GMFCS (Gross Motor Function Classification System) Scale, muscle tone (pathological hypertonia) by means of the Modified Ashworth Scale, mastication and swallowing impairments through the Likert Scale, and sialorrhea using the Thomas-Stonell and Greenberg Scale.

The following information is provided by Palisano et al. (1997) and Cerebral Palsy Alliance (2018). Thus, the GMFCS Scale assesses the level of gross motor skills in children with CP and mainly aims at movements such as sitting, walking and using mobility devices. This scale is useful because it gives families and clinicians a clear description of the child's current motor function and an idea of what equipment or mobility aids a child may need in the future (crutches, walking frames, wheelchairs). The gross motor functions of children with cerebral palsy can be classified into 5 different levels as follows:

Level I: children walk independently in most indoor and outdoor settings and carry out daily activities such as running and jumping, but their speed, balance and coordination are limited.

Level II: children walk in indoor and outdoor settings and climb stairs using the railing, a handheld mobility device or with assistance, but they have difficulty moving on uneven terrain,

inclines, or in crowded areas; they have minimal ability to perform gross motor skills such as running or jumping.

Level III: children walk using a handheld mobility device in most indoor settings, climb stairs holding onto a railing with assistance, use wheeled mobility when traveling longer distances and can self-propel over shorter distances.

Level IV: children have severely limited walking abilities even with assistive devices; they typically require wheeled mobility in most settings, are capable of operating their own powered wheelchair and can participate in transfers from a sitting position.

Level V: children have severe physical impairments that limit their motor control during arm and leg movements and their ability to maintain antigravity head and trunk postures; their motor function is impaired at any level, so they cannot maintain a sitting and standing position independently even with assistive devices and cannot move independently without assistance.

The degree of hypertonia (spasticity) of the research participants was tested using the Modified Ashworth Scale (MAS), which is the most widely used and universally accepted clinical assessment scale for measuring muscle tone (Charalambous, 2014). The original version of this scale was designed as a 5-point numerical scale with scores ranging from 0 to 4, where 0 indicated lack of resistance (spasticity), while 4 characterised the maximum form of rigidity, with the limbs in flexion at rest. Subsequently, the scale was modified and 1+ was added to increase sensitivity. From that moment on, the Modified Ashworth Scale has been applied in both practice and research as a method of measuring spasticity.

This scale grades spasticity as follows (Bohannon & Smith, 1987):

- 0 - normal tone; no increase in muscle tone;
- 1 - slight increase in muscle tone, manifested by either a catch and release or minimal resistance at the end of the range of motion when the affected part (or parts) is moved in flexion or extension;
- 1+ - slight increase in muscle tone, manifested by a catch followed by minimal resistance throughout the remainder of the range of motion;
- 2 - more marked increase in muscle tone through most of the range of motion, but the affected part (or parts) is easily moved;
- 3 - considerable increase in muscle tone, passive movement is difficult to perform, and the affected part (or parts) cannot be moved throughout the range of motion;
- 4 - severe hypertonia, passive movement is impossible, and the affected part (or parts) is rigid in flexion and extension.

Mastication and swallowing impairments were assessed using a 4-point Likert Scale. Orofacial motor function is measured in order to establish the disability status, because it concerns, among other things, the child-family communication through words or facial expression during feeding (Căciulan, 2008).

For the mastication difficulty, the scale is as follows: 0 - mastication of solid foods is within normal limits; 1 - very slight difficulty, solid foods are ingested, except for those with hard consistency; 2 - slight difficulty, semisolid foods are ingested; 3 - moderate difficulty, mashed foods are ingested; 4 - severe difficulty, liquid foods are ingested.

For the swallowing difficulty, the scale is as follows: 0 - swallowing is within normal limits; 1 - very slight difficulty, solid foods are ingested, except for those with hard consistency; 2 - slight difficulty, semisolid foods are ingested; 3 - moderate difficulty, mashed foods are ingested; 4 - severe difficulty, liquid foods are ingested.

Sialorrhea was assessed with the Thomas-Stonell and Greenberg Scale (Thomas-Stonell & Greenberg, 1988). It was used to establish the severity of hypersalivation (which is common in cerebral palsy) on a scale of 1 to 5 as follows:

- 1 - dry (never drools);
- 2 - mild (wet lips only);
- 3 - moderate (wet lips and chin);
- 4 - severe (wet clothes);
- 5 - profuse (wet clothes, hands, trays, objects within reach).

Rehabilitation protocol

The intervention protocol applied to the study participants consisted of a classic rehabilitation programme using instrumental facial massage procedures and neuromotor stimulation techniques in order to improve mastication and swallowing functions and increase the level of motor development for children diagnosed with CP.

Instrumental facial massage procedures are based on the use of vibratory stimuli for facial and intraoral muscles by means of an electric-powered facial massager. The proprioceptive impulse generated after applying these vibrations propagates to the somatosensory and motor cortex, having the effect of improving motor control, increasing muscle tone and producing sensory stimulation (Marconi et al., 2011).

Instrumental stimulation procedures were applied to the temporal and masseter muscles with the effect of sensory stimulation, toning facial muscles and controlling depression and elevation movements of the mandible at the following levels: tongue and suprahyoid muscles in order to improve tongue control, with an important role in transporting the food bolus; lips, the region around them and the mentalis muscle, with a role in desensitising the lips and improving their control during mastication (Figure 1).

Instrumental stimulation was performed for 2 minutes for each peri- and intraoral area.

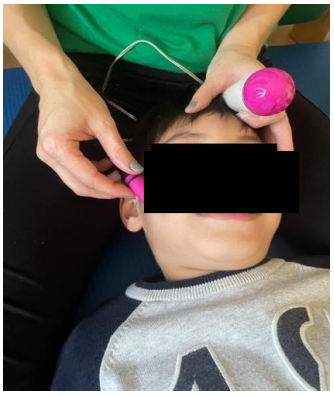

Figure 1. Instrumental facial massage

To increase the level of motor development, passive mobilisation techniques were used in order to improve joint mobility in the upper and lower limbs; these techniques were performed slowly to avoid creating discomfort and were adapted to the motor potential of each participant to avoid increasing the degree of spasticity (Figure 2).

Figure 2. Elbow joint mobilisation

Decontracting techniques were used for the flexors of the upper limbs, hamstrings, triceps surae and adductors (Figure 3) to reduce spasticity at these levels, while balance and core stabilisation exercises were used to improve postural control and proprioception.

Figure 3. Decontracting technique for the adductor muscles

Results

Preliminary data analysis highlighted that no excessive values (outliers) were identified for the research participants in the 4 tests applied to determine the level of gross motor skills (GMFCS Scale), muscle tone (Modified Ashworth Scale), mastication and swallowing impairments (Likert Scale) and sialorrhea severity (Thomas-Stonell and Greenberg Scale).

The main indicators of descriptive statistics were calculated for the group of participants (N = 10) regarding their results obtained in the 4 tests performed during the initial and final assessments.

We present below the values of the main statistical indicators, namely: mean (m), median (the value separating a data set into two equal halves), mode, standard deviation (S), coefficient of variation (Cv), skewness (asymmetry index) and kurtosis (flatness index) for the experimental group that included 10 participants (N = 10), considering the results obtained in the initial assessment of their gross motor skills, muscle tone, degree of mastication and swallowing impairments and degree of sialorrhea severity.

Indicators of descriptive statistics – Initial assessment – 4 tests

Table 1. *Descriptive statistics – experimental group results for the 4 tests – initial assessment*

	Initial assessment results				
Statistical indicators	Gross motor skills (GMFCS Scale)	Muscle tone (MAS)	Degree of swallowing impairment (Likert Scale)	Degree of mastication impairment	Degree of sialorrhea severity
N	10	10	10	10	10
Mean	3.70	3.80	4	3.9	4.30
Median	4	4	4	4	4
Mode	4	4	4	4	4
S	0.48	0.42	0	0.31	0.48
Cv	0.13	0.11	0	0.08	0.11
Skewness	-1.03	-1.77	-	-3.16	1.03
Kurtosis	-1.22	1.40	-	10	-1.22

Table 1 shows the values of the main indicators of descriptive statistics resulting from the initial assessment of gross motor skills (GMFCS Scale), muscle tone (Modified Ashworth Scale), degree of mastication and swallowing impairments (Likert Scale) and degree of sialorrhea severity (Thomas-Stonell and Greenberg Scale):

- Gross motor skills – the arithmetic mean of the experimental group is m = 3.70, the median is 4, the mode has the value 4, the standard deviation is S = 0.48, and the coefficient of variation is 0.13, which indicates that the homogeneity of the results is ensured; skewness (-1.03) and kurtosis (-1.22) indices fall within the range ± 1.96, showing that the normal distribution of data is ensured (Hahs-Vaughn, 2020);
- Muscle tone – the group results are as follows: arithmetic mean = 3.80, median = 4, mode = 4, standard deviation S = 0.42, coefficient of variation = 0.11, indicating that the group is homogeneous; skewness = -1.77 and kurtosis = 1.40, which reveals that the normal distribution of data is ensured;
- Degree of swallowing impairment – the arithmetic mean, mode and median have the same value (4), with all participants obtaining the same score, namely 4 points (which indicates a severe impairment, with liquid foods being ingested);
- Degree of mastication impairment – the group results are as follows: arithmetic mean = 3.9, median and mode = 4, standard deviation S = 0.31, coefficient of variation = 0.08, indicating that the group has a similar level (homogeneous group); skewness = -3.16 and kurtosis = 10, so the distribution is asymmetric, leptokurtic (positive kurtosis);

- Degree of sialorrhea severity – the group results are: arithmetic mean = 4.30, median = 4, mode = 4, standard deviation S = 0.48, coefficient of variation = 0.11, meaning that the group is homogeneous; skewness = 1.03 and kurtosis = -1.22, which indicates that the research data are normally distributed.

Indicators of descriptive statistics – Final assessment – 4 tests

Table 2. *Descriptive statistics – experimental group results for the 4 tests – final assessment*

Statistical indicators	Final assessment results				
	Gross motor skills (GMFCS Scale)	Muscle tone (MAS)	Degree of swallowing impairment (Likert Scale)	Degree of mastication impairment (Likert Scale)	Degree of sialorrhea severity
N	10	10	10	10	10
Mean	3.60	2.80	3	3.50	3.50
Median	4	3	3	3.5	3
Mode	4	3	3	3; 4	3
S	0.51	0.42	0	0.52	0.70
Cv	0.14	0.15	0	0.15	0.20
Skewness	-0.48	-1.77	-	0	1.17
Kurtosis	-1.27	1.40	-	1.76	0.57

Table 2 shows the values of the main indicators of descriptive statistics resulting from the final assessment of gross motor skills (GMFCS Scale), muscle tone (Modified Ashworth Scale), degree of mastication and swallowing impairments (Likert Scale) and degree of sialorrhea severity (Thomas-Stonell and Greenberg Scale):

- Gross motor skills – the arithmetic mean of the experimental group is m = 3.60, the median is 4, the mode has the value 4, the standard deviation is S = 0.51, and the coefficient of variation is 0.14, which indicates that the homogeneity of the results is ensured; skewness (-0.48) and kurtosis (-1.27) indices fall within the range ± 1.96, showing that the distribution is symmetrical and the research data are normally distributed;
- Muscle tone – the group results are as follows: arithmetic mean = 2.80, median = 3, mode = 3, standard deviation S = 0.42, coefficient of variation = 0.15, indicating that the group is homogeneous; skewness = -1.77 and kurtosis = 1.40, which reveals that the normal distribution of data is ensured;
- Degree of swallowing impairment – the arithmetic mean, mode and median have the same value (3), with all participants obtaining the same score, namely 3 points (which indicates a moderate impairment, with mashed foods being ingested);
- Degree of mastication impairment – the group results are as follows: arithmetic mean = 3.5, median = 3.5, the distribution is bimodal (with most participants recording the values 3 and 4), standard deviation S = 0.52, coefficient of variation = 0.15, meaning that the homogeneity of the results is ensured; skewness = 0 and kurtosis = 1.76, which reveals that the data are normally distributed;
- Degree of sialorrhea severity – the group results are: arithmetic mean = 3.50, median = 3, mode = 3, standard deviation S = 0.70, coefficient of variation = 0.20, so the group is

homogeneous; skewness = 1.17 and kurtosis = 0.57, which indicates that the data are normally distributed.

Elements of inferential statistics

Using the Wilcoxon Test for two dependent samples we investigated the existence of statistically significant differences between the results obtained by the research participants in the initial and final testing. Through this non-parametric test, we therefore compared their scores in the 4 tests performed during the initial and final assessments.

Table 3. *Results for the 4 tests – Initial assessment vs. final assessment*

	Initial assessment vs. final assessment				
Wilcoxon Test	**GMS**	**MT**	**DSI**	**DMI**	**DSS**
Wilcoxon	1.00	0	0	10	5.5
Z	-	- 2.803	-2.803	-	- 2.242
P	1.00	0.00	0.00	0.07	0.02
R	-	0.88	0.88	-	0.70

Note: GMS = gross motor skills; MT = muscle tone; DSI = degree of swallowing impairment; DMI = degree of mastication impairment; DSS = degree of sialorrhea severity.

Statistical data analysis (Table 3) comparing the initial and final results obtained by the research participants in the 4 tests mentioned above has revealed that:

- There are no statistically significant differences (p = 1.00) between the initial results (median = 4) and the final results (median = 4) for gross motor skills.

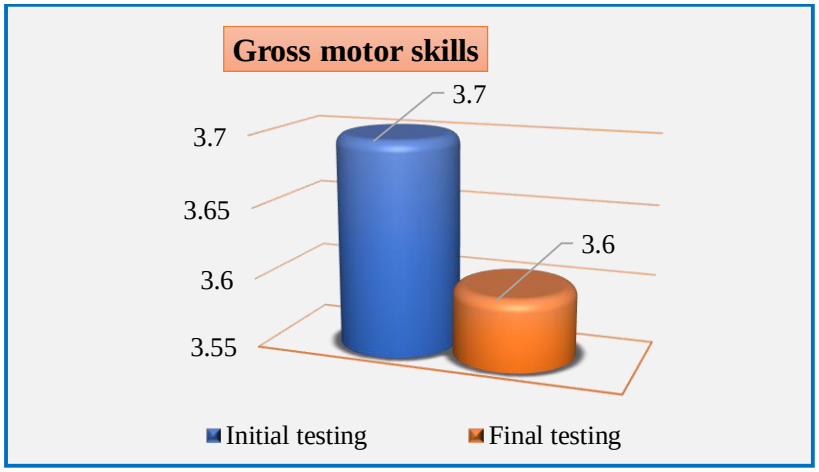

Figure 4. Comparison of gross motor skill levels recorded in the initial and final testing

Although no significant differences are found, analysing the average scores obtained by the experimental group in the initial testing compared to the final testing, an improvement can still be noticed in children's basic motor skills (Figure 4).

- There are statistically significant differences (p < 0.01) between the initial results (median = 4) and the final results (median = 3) for muscle tone.

The effect size indicator r = 0.88 for muscle tone reveals, according to the literature (Ellis, 2010), that the experimental intervention has a very strong effect on the participants' scores,

which have significantly improved from severe hypertonia (level 4) to a substantial increase in muscle tone (level 3).

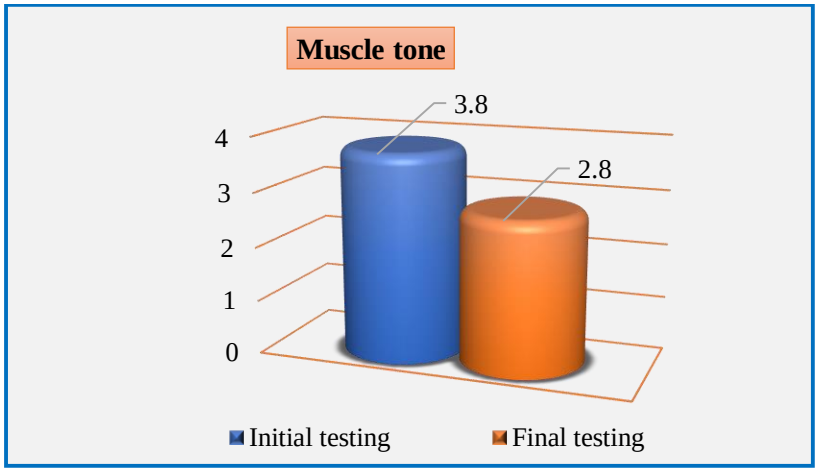

Figure 5. Comparison of muscle tone levels recorded in the initial and final testing

Figure 5 graphically illustrates the comparison of average scores obtained by the research participants in the initial and final testing for muscle tone, which has significantly improved after the experimental intervention.

- There are statistically significant differences ($p < 0.01$) between the initial results (median = 4) and the final results (median = 3) for the degree of swallowing impairment.

The effect size indicator is $r = 0.88$ for the degree of swallowing impairment, meaning that the experimental intervention has a very strong effect on the obtained results, in the sense that the participants' severe impairment has turned into a moderate impairment, they being thus able to eat mashed foods.

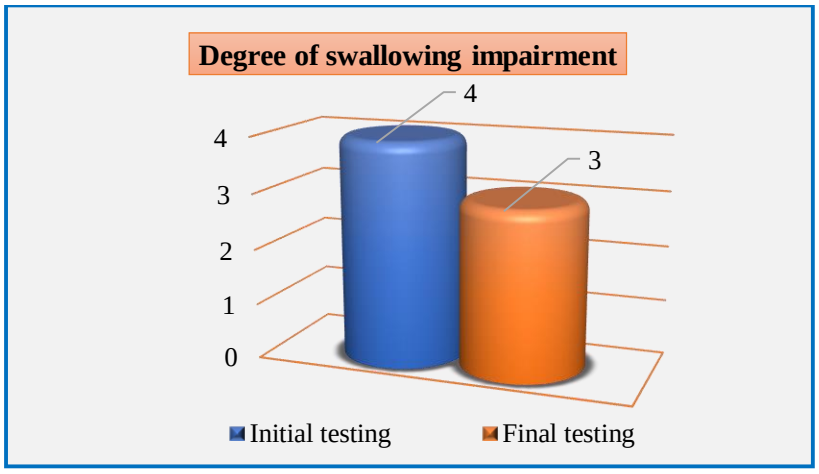

Figure 6. Comparison of the degrees of swallowing impairment recorded in the initial and final testing

Figure 6 shows the comparison of average scores obtained by the research participants in the initial and final testing for the degree of swallowing impairment, which has significantly improved ($p < 0.01$) after the experimental intervention.

- There are no statistically significant differences ($p > 0.05$) between the initial results and the final results for the degree of mastication impairment.

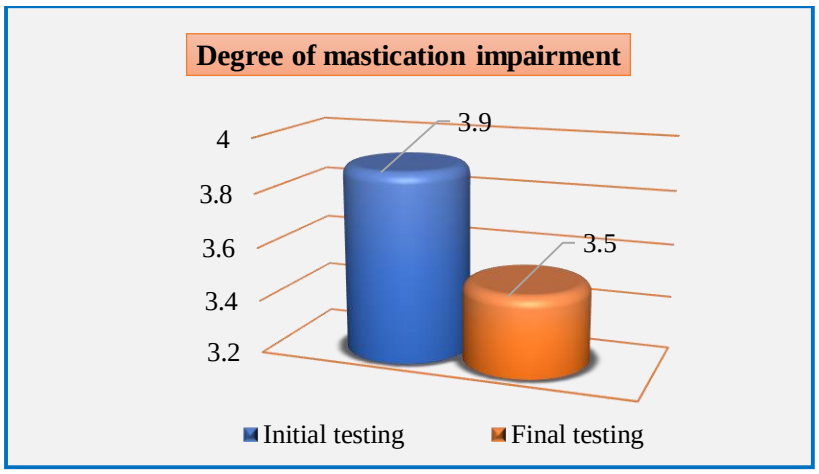

Figure 7. Comparison of the degrees of mastication impairment recorded in the initial and final testing

Although no significant differences are found, analysing the average scores obtained by the experimental group in the initial testing compared to the final testing, an improvement can still be noticed in the degree of mastication impairment (Figure 7).

- There are statistically significant differences ($p < 0.05$) between the initial results (median = 4) and the final results (median = 3.50) for the degree of sialorrhea severity.

The effect size indicator is $r = 0.70$ for the degree of sialorrhea severity, showing a very strong effect of the experimental intervention (treatment) on the participants' scores, which have significantly improved from severe sialorrhea to a higher stage – moderate sialorrhea.

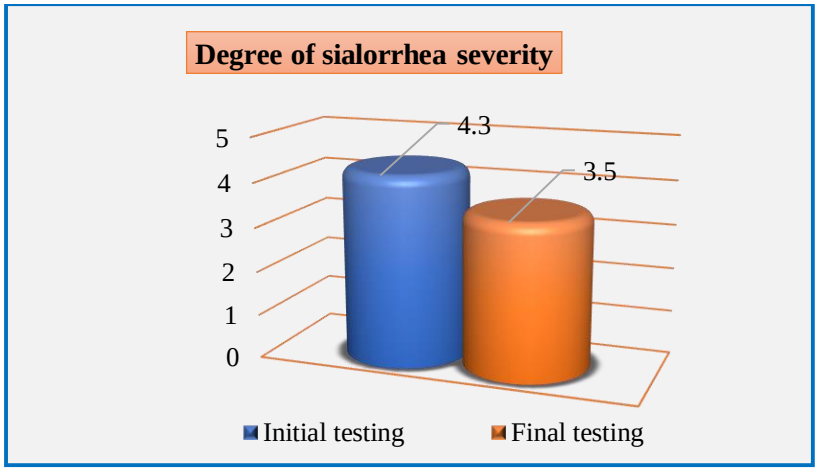

Figure 8. Comparison of the degrees of sialorrhea severity recorded in the initial and final testing

Figure 8 shows the comparison of average scores obtained by the research participants in the initial and final testing for the degree of sialorrhea severity, which has significantly improved after the experimental intervention.

Discussion

Through the present study, we aim to identify effective means of improving mastication and swallowing functions but also reducing sialorrhea in order to enhance the feeding process and increase the level of motor development for children diagnosed with CP suffering from severe orofacial impairment.

As regards orofacial education, specialised studies highlight the beneficial effects of instrumental procedures based on the use of vibratory stimuli for orofacial muscles and structures to improve oral motor functions and reduce sialorrhea within the complex protocol for the rehabilitation of children with cerebral palsy. Some authors (Bavikatte et al., 2012) believe that the use of instrumental facial massage procedures is an effective and easy-to-apply option even in the case of patients with a low cognitive level, because it requires their minimum involvement.

In a study regarding the impact of applying vibratory stimuli to the facial muscles, Russo et al. (2019) demonstrate the beneficial effect of instrumental facial massage on reducing hypersalivation in patients with CP, given that it acts on the cause of sialorrhea (lack of motor control) rather than its effect (a decrease in saliva production) as is the case with other orofacial stimulation techniques. As a complement to the above study, the present research demonstrates through statistical results the effectiveness of applying vibratory stimuli to the facial muscles, with a beneficial impact on reducing sialorrhea and improving mastication but especially swallowing.

In this context, it is useful to monitor the behaviour of oral motor functions and sialorrhea reduction after applying a vibratory instrumental stimulation programme associated with neuromotor stimulation techniques within the classic rehabilitation protocol for children with CP. Although there are several orofacial approaches, we believe that the use of instrumental facial massage could be helpful in reducing disabling symptoms.

In terms of increasing the level of motor development, we used passive mobilisation techniques for the upper limbs to increase mobility in the wrist, elbow and scapulohumeral joints, but also for the lower limbs to increase mobility in the ankle, knee and hip joints. Passive mobilisation has a very important role in the rehabilitation programme for people with cerebral palsy, because the presence of spasticity usually produces a significant joint impairment, which can result in joint stiffness.

Also, decontracting techniques play an important role in the rehabilitation protocol for children with CP due to their extremely beneficial effects on reducing spasticity. In general, depending on the clinical form, hypertonia is present in the flexors of the upper limbs, hamstrings, triceps surae and adductors. Decontracting techniques applied constantly and in the long term reduce the risk of joint deformity.

The presence of muscle contracture and low muscle tone is thought to be one of the main causes of balance disorders in CP. In a study by Taylor et al. (2004), it has been demonstrated that better muscle elasticity leads to increased motor performance in children with CP.

However, despite the widespread use of decontracting techniques, there is little evidence to prove their effectiveness over periods longer than 6 months (Katalinic et al., 2011).

A fundamental component with an important role in postural stability is postural control. Unfortunately, this pathology is accompanied by the inability to recover from unexpected balance disturbances, which leads to poor postural control as an essential element in carrying out daily activities (Chen et al., 2013). Postural control is based on balance, which is why exercises designed to improve this component play a very important role in the rehabilitation protocol for children with CP in order to increase their level of motor development.

The results obtained after implementing the proposed rehabilitation protocol highlighted the effectiveness of applying both vibratory stimuli through the use of instrumental facial massage (with notable results for the improvement of mastication function and sialorrhea reduction) and the techniques aimed at increasing the level of motor development.

Throughout this experimental study, the principles of research ethics were respected by ensuring anonymity, confidentiality and data protection.

Conclusion

The serious consequences of orofacial disorders require the development of a specially designed orofacial education programme as an integral part of the complex treatment for children with CP. Thus, normal and appropriate feeding will provide these children with the nutrition necessary for a healthy life and prevent the occurrence of possible metabolic imbalances associated with mastication and swallowing impairments.

Constant and continuous application of instrumental facial massage procedures associated with exercise has beneficial effects on mastication control and sialorrhea reduction in children with cerebral palsy with severe orofacial impairment.

Statistical results highlighted that the proposed intervention programme for improving gross motor skills, muscle tone, the degree of swallowing and mastication impairments and the degree of sialorrhea severity proved to be effective in the case of the 10 participants, their scores improving at the end of the research compared to those recorded at the beginning of the study. We admit however that the limitation of our research is represented by the small sample size, and the results should be interpreted with caution, their generalisation being limited.

Funding: This research received no external funding.

Institutional Review Board Statement: The research was conducted according to the principles stated in the Declaration of Helsinki. Written informed consent was obtained from all patients. The study was approved by the Ethics Committee of the National University of Physical Education and Sport in Bucharest, with no. 52/SG.

Informed Consent Statement: The written informed consent for the children to participate in this study was obtained.

Data Availability Statement: Data are available upon request to the contact author.

Conflicts of Interest: The authors declare no conflict of interest.

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