

# KABAT REHABILITATION FOR FACIAL NERVE PARALYSIS: PERSPECTIVE ON NEUROKINETIC RECOVERY AND REVIEW OF CLINICAL EVALUATION TOOLS

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**Abstract: Background:** Facial nerve paralysis (cranial nerve VII) is one of the most common neurological disorders affecting the cranial nerves. Symptoms of this disorder are not life threatening but can cause worry and discomfort. Peripheral paralysis of the facial nerve is a disabling pathology; it affects the functional, psychological, social and occupational aspects of life. The Kabatre habilitation method for facial paralysis can evoke or restore the neuromuscular circuit through stimulation of the proprioceptors, restoring the normal functionality of nerve endings in the muscles. **Objectives:** This study intends to demonstrate how patients can benefit, both aesthetically and functionally, from proper clinical evaluation followed by a rehabilitation program based on the Kabat method. **Methods:** The study is qualitative and has an experimental and multicenter design. Data was collected through a clinical record and using a specific questionnaire for this type of pathology for monitoring the satisfaction and improvements of the patient; Functionality evaluation of the facial nerve was based on the SFG Sand H-B scales. **Results:** The study has shown that patients, who were treated with steroid-antiviral therapy and PNF rehabilitation method, recovered motor abilities of the paralyzed hemi facial. In addition, patients improved thermal, pain and position sensitivity. **Conclusions:** It is possible to conclude that a correct and timely diagnosis is very important, as well as using valid evaluation and data collection tools, properly managing the improvement through standardized clinical evaluation scales and a proper medical and physiotherapy treatment plan. **Limitations:** The limits encountered during the study were: limited number of samples; the short period of observation, not enough to include severe prognosis and full improvement of expressive gestures.

**Keywords:** facial nerve, facial palsy, neuromuscular re-education, proprioceptive facilitation, rehabilitation.

**Abbreviations:** PNF= Proprioceptive Neuromuscular Facilitation; CN = cranial nerve; H-B = House Brackmann; SFGS = Sunnybrook Facial Grading System

## INTRODUCTION

With 23-35 out of 100.000 cases, the peripheral paralysis of the seventh CN is the most frequent paralysis of the peripheral nervous system.[1]

Occurring in response to various etiologies (congenital, iatrogenic, tumor, traumatic, infectious, or idiopathic), this highly debilitating [2] pathology can affect the seventh CN at any level

along its course, starting from the nucleus up to the neuromuscular junction. The motor ability of the face is altered and can no longer be controlled by the patient; the appearance of the face changes, both at rest and, most of all, during movement.

In several cases, there is a midline deviation on the face caused by the prevailing muscularity of the healthy side, also at rest.[3]

Damage is mainly caused by some motor fibers of the facial nerve, which lose their ability to function and for this reason, physiotherapy for facial paralysis intends to reinforce the undamaged neuromuscular part.

Facial nerve paralysis is a dysfunctional problem affecting, and in this case altering a delicate part of the body that provides personality and identity to the subject.[4]The patients require special consideration because their communication is affected in social circumstances;[5] as speech, mastication and the ability to express feelings and emotions depend on facial muscle movement.

Either way, functional, psychological, social and occupational aspects of life are seriously affected. [6,7]

In recent years, clinical research on peripheral facial paralysis has gained larger interest; knowledge is expanding in regards to the implementation of manual therapy,[8,9]exercises, acupuncture,[10]laser[11] and electrical stimulation.[12]

This study intends to evaluate the effects of the Kabat method as a form of rehabilitation for restoring the seventh cranial nerve,[13]associated with corticosteroid and antiviral pharmacological treatment, and the effectiveness of clinical evaluation tools for improving data collection and monitoring both progress made and results obtained after the treatment. The study was conducted in the city of Tirana, in Albania, a State in which rehabilitation started in the 90's and is still growing. Only a few specialists who studied abroad recognize and use physiotherapeutic methods within a rehabilitation facility. Rehabilitators, particularly facing cases of facial paralysis, do not have a standard for organizing and collecting data from the patient, which can be easily transmitted and help monitor the progress made and the results obtained following the treatment.

## **MATERIALS AND METHODS**

### **2.1 SAMPLE**

The study is qualitative and has an experimental and multicenter design.

After specialized medical examination, patients affected by peripheral facial paralysis from varying etiology were treated with corticosteroid and antiviral medicines and followed a physiotherapy program based on the PNF method.

Prior evaluation, each subject was informed about the study and had to complete a questionnaire and provide signed permission for allowing processing of sensitive data that were to be obtained from each patient's sample.

The study was carried out with the approval of the Governing Council of QSTU "Nene Tereza" hospital in Tirana, during a period extending between March 2015 and November 2016.

Ten patients (5 males and 5 females) affected by peripheral facial paralysis were chosen according to the following criteria:

- ) Patients of both genders;
- ) Specialized diagnosis of the peripheral facial paralysis;
- ) Corticosteroid and antiviral treatment;
- ) Patients undergoing physiotherapeutic treatment according to Proprioceptive Neuromuscular Facilitation Techniques.

*Criteria excluded from the study were:*

- ) Patients diagnosed with central facial paralysis;
- ) Patients with cognitive deficits;
- ) Presence of severe pathologies involving the central/peripheral nervous system;
- ) Patients presenting active infection or inflammation;
- ) Presence of important complex clinical situations or comorbidities such as serious psychiatric disorders, Ictus.
- ) Patients undergoing different medical or physiotherapy treatment from those proposed in the study.
- ) The average age was 36. Etiologies included 40% idiopathic paralysis, 20% acute otitis media, 20% of infection caused by Herpes Simplex, 10% of infection caused by Herpes Zoster, 10% caused by neuronal tumor.

## **2.2 TOOLS**

Data was collected from all patients, which participated in the study, using the following tools:

- ) Clinical rehabilitation folder.
- ) Ad hoc questionnaire filled by the patient.
- ) Functional evaluation of the seventh CN, both on first observation and at full recovery of the functional framework, nevertheless, for a maximum period of six months.

The grading system includes the following scales: House-Brackmann (HB)[14] and the Sunnybrook Facial Grading System.[15]

This grading system could measure facial dysfunctions in a subtler way compared to the H-B and was particularly sensitive evaluating the improvements following facial rehabilitation.

- Physiotherapeutic Techniques: Patients, who are followed by the Physiotherapist during the Kabat Rehabilitation session, perform specific movements with predefined patterns. These spiral and diagonal movements involve the muscles, which are brought to train in global patterns. Precisely, during rehabilitation of the facial nerve, 3 fulcrums are found, whose muscles can be stimulated:

- Upper fulcrum: includes the frontalis, corrugator and orbicularis muscles of the eye;
- Intermediate fulcrum: Includes the common elevator muscle of the upper lip and wing of nose, the dilator naris and the mirtiforme
- Lower fulcrum: includes the zygomaticus major, the zygomaticus minor, the risorius, the orbicularis, the triangular of the lower lip, buccinator, chin muscle and square muscle of the chin.

As with all cranial nerves, some specific techniques can also be applied on the facial nerve to enhance responses and improve recovery; the most important are:

- ) The rhythmic start: shows and guides the subject into the movements and the scheme;
- ) The inversion of the agonist: utilizes sequential concentric and eccentric contractions;
- ) The inversion of the antagonist: reinforces responses through the induction phenomenon;
- ) Repeated contractions: calls for a response with repeated stretching that briefly enables movement;
- ) Isometric contractions: for stabilizing and reinforcing the response.

Therefore, by applying pressure on the face, in combination with traction movements, both somatic and proprioceptive sensitivity is stimulated; this, coupled with the patient's willingness to try to maintain and/or obtain contraction of the muscles, stimulates central and peripheral nervous structures with the result of reactivating the damaged muscle areas.

It includes the use of five of the seven basic techniques: scheme, manual contact, resistance, verbal command, stretching.

## RESULTS

The collected data using the adopted evaluation tools show, through Table 1, that 40% (4 pcs) of 10 patients (5 males and 5 females) between 10 and 67 years old (mean age of 36), showed lesion to the left CN VII and 60% (6 pcs) to the right, no patient showed bilateral facial nerve lesion.

Patients were observed for an average of 6 months for significant changes of the facial function, especially in younger adults.

**Table (1): Changes of the facial function after 6 month**

PATIENTS	AGE	GENDER	LESION	H-B		SFGS	
				BEFORE	AFTER	BEFORE	AFTER
1	10	F	DX	V	I	4	96
2	11	F	DX	V	I	4	96
3	15	M	DX	III	I	74	100
4	22	M	DX	IV	I	20	100
5	28	F	SX	IV	II	20	82
6	45	F	SX	IV	II	8	78
7	51	M	DX	IV	II	8	84
8	55	F	SX	V	II	4	82
9	60	M	SX	IV	II	2	76
10	67	M	SX	V	III	4	66
MEAN	36,4	/	/	/	/	14,8	86
MODE	/	/	/	IV	II	/	/
MEDIAN	/	/	/	IV	II	/	/
DS	/	/	/	0,674949	0,674949	21,81131	11,50845

According to the House Brackmann scale, during the initial state, 10% (1 pcs) showed grade III, 50% (5 pcs) grade IV and 40% (4 pcs) grade V with MODE of grade IV and MEDIAN of grade IV.

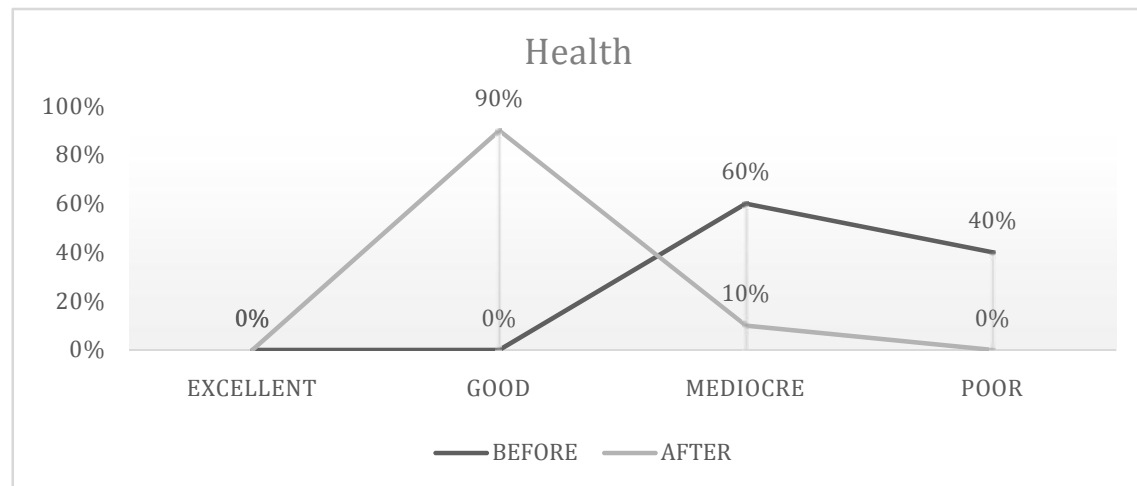
After treatment, patients improved with 40% grade I, 50% grade II and 10% grade III; MODE and MEDIAN grades decreased to II.

Similarly, for the Sunnybrook Facial Grading System, patients before rehabilitation showed a global score of the facial function, which is obtained by the difference between the voluntary movement score, the symmetry at rest and the synkinesis of 14.8. Following rehabilitation, higher score is obtained from improvement of the three subscales composing the scale, resulting in an average score of 86.

Out of 10 patients, only one manifested synkinesis at the beginning of treatment with a total score of 6/15 and a final score of 2/15.

Data collected from each patient through the questionnaire, before and after the treatment, has proven to be useful. According to the patient, this tool revealed an improvement of their psychophysical conditions.

Health has improved from MEDIOCRE (60%) and POOR (40%) to GOOD (90%) (Chart 1). Only one patient remains in the MEDIOCRE state and none are EXCELLENT, as there are some breaches that can be filled by extending treatment beyond the 6 months period of the study.



**Chart.1: Health status before and after treatment**

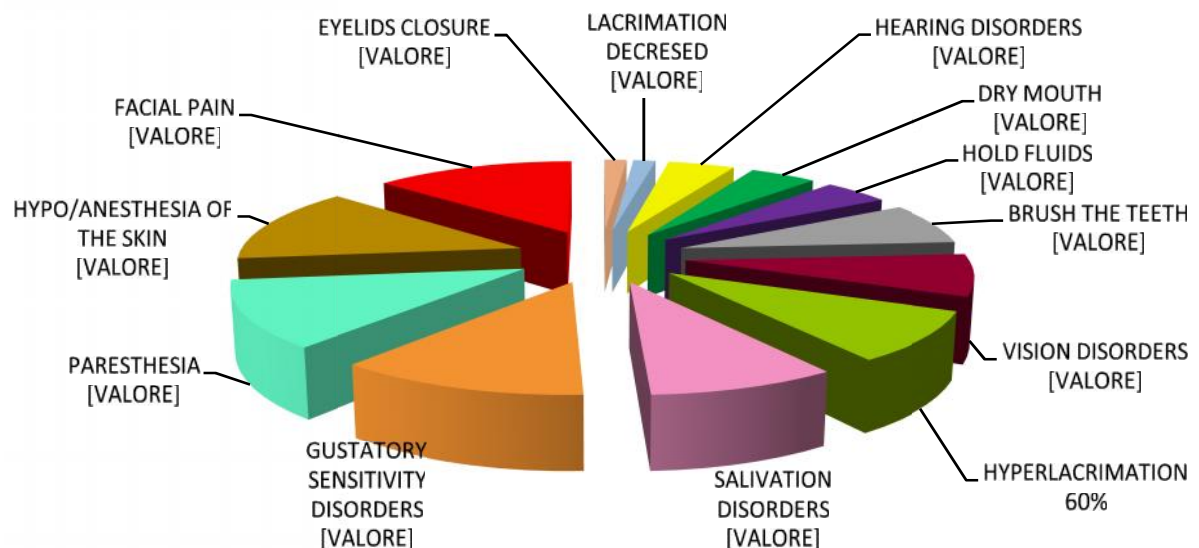
As shown in Table 2, 90% (YES) of the patients considered facial paralysis to be the cause of discomfort in their social, private and occupational spheres, with a MEDIAN and MODE of 7, while after the treatment discomfort persists only in 20% (YES).

**Table (2): Level of discomfort before and after treatment**

BEFORE	Patients	1	2	3	4	5	6	7	8	9	MEDIAN	MODE	DS
	Level of discomfort	5	5	7	7	7	8	8	8	9	7	7	1,364225
AFTER	Patients	1	2										
	Level of discomfort										4	/	1,414214

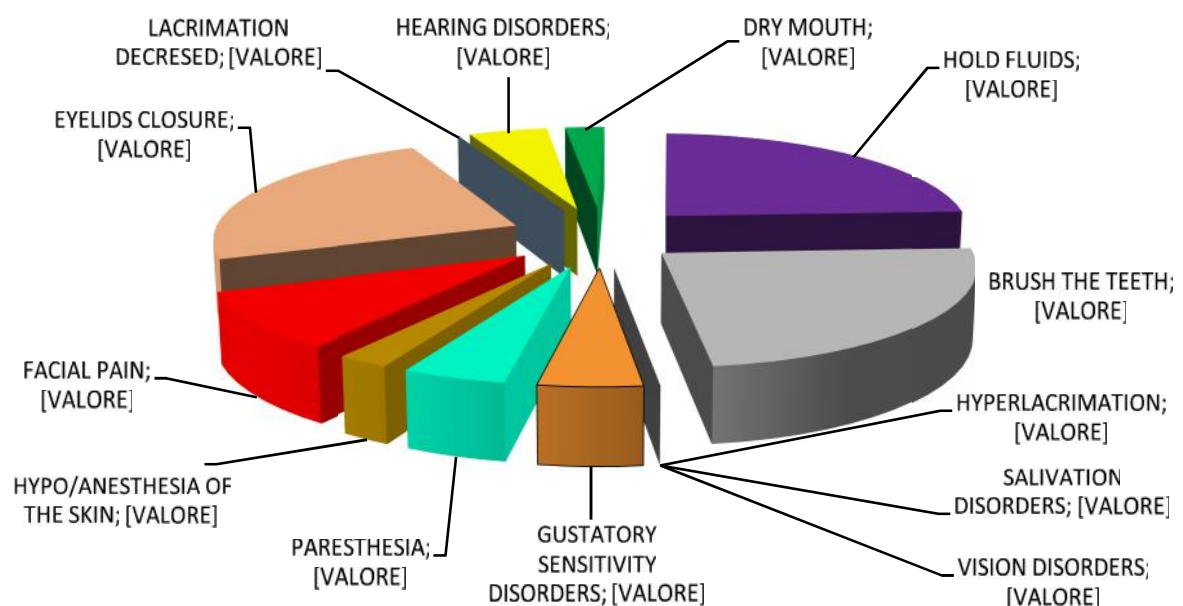
Chart 2 highlights the positive responses to each individual question. Only 10% of the patients are able to close their eyelids and lacrimation is decreased; 30% suffer from hearing disorders, dry mouth and are able to hold fluids; 50% can brush their teeth and suffer from vision disorders; 60%

suffer from hyper lacrimation and salivation disorders; 80% suffer from gustatory sensitivity disorders and paraesthesia; 90% suffer from hypo/anesthesia of the skin and facial pain.



**Chart.2: Deficit before treatment**

Chart 3 shows the positive responses to the question after the treatment, where 100% of the patients are able to close their eyelids, brush their teeth and hold fluids; In 40% facial pain persists; 20% continue to suffer from hearing disorders, taste sensitivity problems and paraesthesia; 10% suffer from hypo/anesthesia of the skin and dry mouth; hyperlacrimation, decreased tear production, salivation disorders, and vision disorders are no longer present in any of the patients.



**Chart.3: Deficit after treatment**

No changes were reported by any of the patients following the pathological event of facial paralysis, while 40% (4 pts) reported suffering concomitant pathologies, which include 20% diabetes, 10% hypertension, 10% thyroid pathologies.

## **DISCUSSION**

The ten patients treated with steroid-antiviral therapy and the PNF rehabilitation therapy method recovered functional motor abilities of the paralyzed hemi facial muscles. Eyelid closure improved during the first session, so it was possible to remove the eye bandage, and there was a general improvement of the buccinator and orbicularis muscles, allowing the lips to close tight. This evolution was so successful that it would be possible to exclude the usage of chewy sticks from the treatment, which would help stimulate the muscles during mastication.

During the following sessions, patients gradually recovered most functionality of all facial muscles: the corrugator muscle, with the re-appearance of forehead wrinkles, and the orbicularis and palpebral muscles with the re-appearance of eye blinking.

Tonicity recovery of the zygomatic muscle and functionality of the common elevator muscle of the nose improved to the extent of favoring the re-appearance of nose-palpebral reflexes.

Also, lower compartment muscles recovered well: patients are able to blow up their cheeks, so, in general, recovery of the face to asymmetrical condition is likely expectable.

Patients also show positive improvement of positional, thermal and pain sensitivity, and no incidence of synkinesis.[16,17]

## **CONCLUSIONS**

Treatment of facial nerve paralysis can be a difficult process that requires persistence. [18]

In this study, all patients recovered a positive static dynamic symmetry, despite the severity, various etiologies and different levels of evaluation. It is possible to conclude that a correct and timely diagnosis is very important, as well as using valid evaluation and data collection tools, properly managing the improvement through standardized clinical evaluation scales and a proper medical and physiotherapy treatment plan.

Rehabilitation combined with medical treatment will help achieve better results while also reducing the time for recovery. To promote functional recovery[19] it must be adapted to the requirements of the patient, while considering the medical diagnosis and proper initial evaluation and defining individual goals.

The Proprioceptive Neuromuscular Facilitation method [20] is among the rehabilitative methods that offer treatment plans for patients that suffer from facial paralysis. It has been proposed and used in this study and demonstrates the studies published in literature, which support and consider this rehabilitation protocol as an effective and useful tool for healing facial nerve disabilities. This type of physical rehabilitation is considered as an integral part of the medical treatment to achieve a better and more rapid recovery of patients that suffer from facial paralysis, especially in severe cases,[21]preventing the development of other complications related to this disease, such as synkinesis and hemispasm. Additionally, when applied at an early stage, recovery proves to be faster and better than for non-rehabilitated patients.[22]



The decision to propose and carry out a study in Albania came from the desire to contribute to the development of this country, which, as a EU membership candidate, is a country that is currently applying reforms in all sectors and a place where innovation and improvement of the quality of health care interventions and services is one of the priorities of the Ministry of Health. Therefore, health and rehabilitation services must be provided with standard tools, certified tools and according to European guidelines.

In regard to rehabilitation services that concern peripheral facial nerve paralysis, there is a lack of standard tools form easuring a dysfunction. Furthermore, patients can benefit from the effects of the Kabat (PNF) therapy method if the therapist is well-trained and able to establish a physiotherapist-patient relationship with perseverance and motivation. Therefore, the presence of a qualified rehabilitation professional is crucial.

## LIMITS

The limit of the study is related to the limited number of samples, as only 10 patients were chosen as they fulfilled the inclusion criteria and agreed to participate in the study. Also, since there were patients with worse prognosis, the predetermined 6 months period of observation would be too short for following the total improvement on the mimicry of expressions, requiring an extended amount of time for the treatment.

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