

Application Of An Integrated Approach To Cognitive Communicative Rehabilitation In Parkinson's Disease

Katia Zambrano Ruiz¹, Marinella Álvarez Borrero¹, Jhon J. Feria Díaz²

¹Faculty of Health Sciences, Universidad de Sucre, Colombia.

²Faculty of Engineering, Universidad de Sucre, Colombia.

ABSTRACT

This is a clinical case of a 63-year-old male patient diagnosed with hypokinetic Parkinson's disease evaluated through standardized and qualitative methods of global cognitive-communicative functioning. A rehabilitation program was implemented applying an integral approach in 237 cognitive, language, and speech therapy sessions interspersed weekly in a 12-month execution time. Which, ten modules of exercises were organized for orientation, memory, attention, language, reading-writing, praxis, executive functions, calculation, speech, interdisciplinary support, and general recommendations to the caregiver for the linear development based on the priority needs of the patient according to moderate cognitive impairment degree. The integral therapeutic process results allowed compensation for the cognitive-communicative deficits of the patient, positively impacting his life quality determined by his improvement in the functional relationship of interaction with his environment from the family and social spheres.

Keywords: Cognitive-Communicative Impairment, Parkinson's disease, Rehabilitation Program, Integral Model

1. INTRODUCTION

Parkinson's disease (PD) is a recurrent, complex, and chronic neurodegenerative condition that is the cause of an important epidemiological situation worldwide, with more than 8.5 million people suffering from the disease, 5.8 million of whom are disabled and 329,000 deaths, which is equivalent to an increase of more than 81% since the year 2000. Therefore, a significant increase is established compared to other neurological disorders by a high prevalence in the last 25 years (WHO, 2022) and incidence by 2040 by estimating a condition in 17 million people according to the disease global burden study by the aging of the population, environmental factors, and early diagnosis with effective treatments (Mullin and Schapira, 2015). In Colombia, epidemiological studies show a prevalence of 4.7 affected per 1,000 people over 50 years of age (MinSalud and Neurology Association, 2022).

The PD semiology is characterized by the motor and non-motor symptoms present in a progressive manner, related to the multiple structures of the central and peripheral nervous system damage (WHO, 2022). In the specific case of hypokinetic disorders related to parkinsonism, there are motor symptoms of tremor at rest, rigidity, bradykinesia, flexed postures, loss of postural reflexes, and gait and balance disorders. Also, a wide non-motor complications variety of cognitive impairment, movement, sleep, mental and sensory disorders that cause linguistic-communicative limitations, mobility, and restrictions in functional tasks of daily living (Kalia & Lang, 2015 as cited in Saavedra, 2019).

In relation to cognitive impairments in PD, scientific evidence determines that symptoms in the initial stages of the disease may present mild cognitive impairment-MCI characterized by a front-subcortical cognitive profile with the dis-executive syndrome (Bocanegra et al., 2014). Also, temporal disorientation, divided and alternating attention deficits, slowing of processing speed to verbal or visual stimuli, dysfunction in immediate memory, visuospatial and communicative difficulties (Kalbe et al., 2016, and Perez et al., 2017). With the disease evolution, the aero-digestive tract is affected, altering the feeding process related to malnutrition, dehydration, or aspiration types of pneumonia due to disorders in swallowing efficiency and safety (Mamolar et al., 2017).

As for communication difficulties, they are related to motor symptoms, mainly bradykinesia and rigidity which affect the basic processes of breathing, phonation, articulation, prosody, and fluency (Pico and Yévenes, 2019). Thus, up to 90% of people with Parkinson's tend to present speech and language disorders determined by showing compromises in the voice qualities of monotony, hoarseness, nasality, breaks, and imprecise articulation, stuttering, and trembling due to the rigidity, slowness, and poor characteristic movements amplitude of the disease (Manzon, 2022). In addition, an association is established between linguistic alterations and the motor impairment produced by PD in the areas that elaborate language in the cerebral cortex with subcortical structures (Paredes and Espinosa, 2020). Therefore, alterations are evidenced in the specific linguistic functions of verbal fluency, naming, and the nonverbal aspects of facial expressions and manual gestures that support oral discourse (Herd et al., 2012, Batum et al., 2021).

The rehabilitation of cognitive-communicative disorders in PD requires an interdisciplinary intervention by the neuropsychologist and the speech-language pathologist, which should begin with a process of evaluation of the global cognitive-linguistic function through the application of standardized neuropsychological batteries, observation, and review of the clinical history (Ferradáns and Soto, 2017). The intervention process is continued under the modality of cognitive behavioral therapy by reeducation, with lectures and didactic material, and practices with oral and written exercises (Advocat et al., 2016, Calleo et al., 2015, Dobkin et al., 2014 as cited in Ferradáns and Soto, 2017). For its part, the basis of logopedic treatment is speech and language therapy through the application of therapeutic techniques of relaxation, breathing, phonation, and articulation. Likewise, myofunctional therapy to improve the orofacial muscle balance that allows adequate neuromotor patterns of behavior of the orofacial system and the understanding of language with the support of nonverbal resources (Manzon, 2022).

Given the above scenario, it is justified the importance of presenting an intervention based on a comprehensive approach of a case study that was addressed in the clinical practice that allowed designing a holistic, comprehensive, and personalized treatment plan executed by neuropsychologist and speech therapist, considering that the cognitive-linguistic aspect presents a significant impairment in PD. However, the relevance of having interdisciplinary teamwork was considered to improve the life quality of the person with PD and his or her family.

2. MATERIALS AND METHOD

2.1 Participant

Male patient, 63 years old, married, father of three children, a lawyer by profession with the clinical picture of 4 years of evolution due to dementia associated with Parkinson's disease determined by a moderate deterioration in the cognitive functions of divided attention, visual perception, verbal short-term memory, anomalous linguistic errors, latency inhibition processes and deficit in cognitive flexibility, with follow-up by neurology and pharmacological management with Sinemet 25/100 mg (5 tablets daily- 1 tab. every 4 hours), nepro-transdermal patch 8 mg/24 hours, ragitar 1 mg -1 tab. daily, and rivotril-2 drops. On reviewing the patient's clinical history and medical records, an acute onset in the encoding and recalling memory processes, verbal fluency, suprasegmental aspects of speech and voice qualities, verbal comprehension of more complex morphosyntactic commands, gnostic-apractic, and viso-constructional deficits are highlighted. Significant changes in mood, hypokinetic gait movements, dependence, anxiety, and insecurity when speaking in public are observed. Likewise, in the attentional and executive functions that are affecting family, social and work performance.

2.2 Procedure

For the subject's participation, an interview was conducted with his spouse and children to be investigated to explain the case study characteristics and to guarantee their collaboration with the voluntary signature of informed consent in accordance with the ethical regulation in research with human beings in Colombia (Resolution 008430 of MinSalud, 1993) and at the international level the Helsinki Declaration (2013).

The evaluation process was developed using a standardized assessment technique for cognitive functions, and qualitative ones for oral and nonverbal communicative aspects. Initially, the anamnesis protocol for neuropsychological assessment proposed by Portellano (2005) was applied, which inquires about family, personal and medical history, onset-evolution of the disease, changes in cognitive functions, and general observations. The mini-mental state examination-MMSE (Folstein et al., 1975 and Lobo et al., 1979), adult intelligence scale-WAIS-IV (Wechsler, 2012), and Neuropsi (Ostrosky et al., 2012) were administered to determine the global cognitive functioning level. Likewise, the criteria of the functional pragmatic approach of Gallardo, 2009 were used for the conversational skills evaluation in the structure of interaction, turn-taking, monitoring strategies, topic management; and nonverbal aspects of paralinguistic, kinesic, proxemic, and nonverbal communicative functions. In addition, in the speech area, the assessment was implemented with the protocol of basic motor processes for the population with neurological damage by Gonzalez and Toledo (2000), which allows examining the breathing parameters, phonation, resonance, and oral motor control in articulation, and prosody. In the same sense, the examinations of musculoskeletal, vocal, and respiratory behavior according to the postulates of Jacksonson, (1992) as cited in Cobeta et al., (2013) allow determining the perceptual characteristics of vocal production, body posture, extra-laryngeal musculature in vocal function and respiratory mechanics. The results interpretation was based on the norms of correction and baremization to determine the specific performance degree of each test with a synthesis of scores establishing the cognitive profile, and for the evaluation qualitative methods of the language and speech area, the characteristic symptoms descriptive tables of the patient were organized.

3. RESULTS OF THE INITIAL EVALUATION

The patient was alert and conscious during the evaluation process. Also, oriented in time, space, and person, collaborative, motivated, and interested in the administration of the tests with functional behavior and operability.

Table 1 shows the results of the mini-mental state examination test determined by clinical-IC risk indicator compromises in the delayed recall processes, and low performance in fixation, attention, and concentration, which indicates that he is in a reference cognitive impairment level, according to the normative data based on the schooling of higher education studies.

Table 1: Results Description of the mini-mental-MMSE test application

AREAS	SCORE	QUALITATIVE DESCRIPTION
Temporal Orientation	4/5	Average
Spatial orientation	4/5	Average
Fixation	2/3	Low average
Concentration and calculation	2/5	Low average
Delayed recall	0/3	I.C
Language	6/9	Average
P.TOTAL	18	COGNITIVE IMPAIRMENT

Table 2 describes the descriptive analysis of the Wechsler intelligence scale for adults' application results. The clinical findings determine that the patient presents a borderline IQ established by compromises in perceptual reasoning for fluid reasoning, spatial processing, and visual-motor integration; in working memory to temporarily retain in memory certain kinds of information, work or operate with it and generate a result, in repeating a list task of numbers in the same or reverse order, remembering a numbers series and letters in ascending and alphabetical order in letters due to deficits in the tasks of attention, concentration, and mental control; and in processing speed in performing simple scanning tasks, sorting, rapid discrimination of visual information and in short-term memory, attention and visual-motor coordination. However, in verbal comprehension, he evidences some conservation in the ability to define and express conceptual similarities between words and to respond to questions involving general principles of knowledge and social situations.

Table 2: Results Description of the Wechsler Adult Intelligence Scale - WAIS-IV application

SUB-TEST	SCALAR SCORE	MEDIA	E.D	INTERPRETATION QUALITATIVE
Cube designs	2	10	3	Low
Similarities	7	10	3	Average
Digit Retention	6	10	3	Low
Matrices	5	10	3	Low
Vocabulary	7	10	3	Average
Arithmetic	7	10	3	Average

Symbol Search	5	10	3	Low
Visual Puzzle	4	10	3	Low
Information	7	10	3	Average
Clues	3	10	3	Low
Scale	SCALE SCORE	RANGE	E.D	INTERPRETATION RANK
Verbal comprehension	85	100	15	Normal average
Perceptual reasoning	64	100	15	Low
Working memory	82	100	15	Low normal
Processing speed	70	100	15	Low
Total IQ	74	100	15	Borderline

Table 3 shows the Neuropsi test results indicating a deficient level of attention for filtering visual stimuli and for activation due to lethargy in accessing the response, compromises in retention, storage, and evocation of short and long-term information. It is demonstrated by very labile memory traces and rapid forgetting of the learned stimulus material. In word tasks, semi-complex figures, spontaneous retrieval by category and recognition; incipient capacity to solve abstraction problems, and in the aspects of planning, sequencing, and organizing information in complex tasks, as well as in the execution of alternate movements and slow opposite reactions. Likewise, deficits were established in semantic and phonological fluency and the lexical field relations due to failures in the access to information by the presence of latencies inhibitory processes, linguistic errors of semantic paraphasias, anomies, perseverations, and circumlocutions; deficiencies in reading comprehension to establish a critical judgment of the text read and in the suprasegmental aspects management of intonation, rhythm, musicality, and slowness in reading speed, and manual graphics for copying activities.

Table 3: Results description of global cognitive functioning Neuropsi test

TEST	SUB-TEST	PD	PN	DESCRIPTIVE CATEGORY
ATTENTION AND CONCENTRATION	Digits	6	1	Normal
	Visual detection hits	6	-3	Severe
	Subtraction 20-3	5	1	Normal
MEMORY CODING	Words	2	-3	Severe
	Semi-complex figures	10	-2	Moderate
EVOCATION MEMORY	Spontaneous	0	-3	Severe
	By category	1	-3	Severe
	Recognition	4	-2	Moderate
	Semi-complex figure	5	-3	Severe
CONCEPTUAL AND MOTOR EXECUTIVE FUNCTIONS	Similarities	8	1	Normal
	Calculation	1	-2	Moderate
	Sequencing	1	-2	Moderate

	Right hand	1	1	Normal
	Left hand	1	1	Normal
	Alternating movements	1	-2	Moderate
	Opposite reactions	1	-2	Moderate
LANGUAGE	Naming	10	1	Normal
	Repetition	4	1	Normal
	Comprehension	4	-2	Moderate
	Verbal semantic fluency	2	-2	Moderate
	Verbal phonological fluency	2	-2	Moderate
READING-WRITING	Reading	2	-2	Moderate
	Dictation	1	1	Normal
	Copying	2	-2	Moderate
TOTAL NEUROPSI		80		MODERATE

Table 4 shows the qualitative assessment result of the patient's oral conversational and nonverbal communicative skills. The findings establish certain deficits in the communicative exchange due to the paralinguistic compromise of vocal resources and their limited variations in the kinesic functionality of facial expression and proxemic due to the motor difficulty in approaching the interlocutor. However, a medium functional level of oral discursive conversational skills is determined, which allows socialization with some restrictions in the family and social context.

Table 4: Results description of the oral and non-verbal communication skills evaluation

VERBAL COMMUNICATION	CHARACTERISTICS PRESENT IN THE PATIENT
Structure of interaction	-Responds to questions with simple comments with minimal length of response. -Deficits in conversational exchange by keeping quiet.
Turn-taking	- Reciprocal but delayed alternation in turn-taking and wait-and-see responses. -Formulates requests that cause breakdowns in the communicative exchange.
Monitoring strategy	- Employs some resources of repetition, confirmation, specification and clarification requests.
Management of the topic	-Use of simple and direct language in the communicative act. -Limitation in expressing opinions and emotions. -Introduces, maintains, changes and ends a conversational topic but with limited comments. -Difficulties with linguistic interference when interpreting ambiguous statements, irony, double meanings, and jokes.

NONVERBAL COMMUNICATION	Para-linguistic	-Limited vocal elements to relate feelings and their expression in words. -Presence of empty silences without meaning.
	Kinesics	-Scarce use of facial expressions to convey information and emotional reactions. -Reduction in the frequency and amplitude of spontaneous blinking movements and facial expressions with frowning. -Limited use of social smiling. -Restricted use of body postures and gestures accompanying verbal communication. -Employs eye contact to reflect interest in communication.
	Proxemics	-Conditioned approach to interlocutor due to mobility difficulties.
NONVERBAL COMMUNICATION FUNCTION		- Mostly emphasizes verbal language in communication.
		-Expresses feelings of joy and sadness orally.
		- Nonverbal resources are not congruent with oral speech.

Table 5 describes the symptomatology evidenced by the patient in the basic motor processes of speech. The findings determine difficulties at the level of Bucco-phonatory motor control, jaw with limited opening and closing, with poor velar mobility that is accompanied by nasal emissions, moderate deficiency in lingual and labial mobility of protrusion, retrusion, lateralization, ascent, and descent; diadochokinesia in the syllables articulatory production and greater complexity series that causes conditions in the continuity and fluency of repetition with alterations in the supra-segmental aspects; variations in the voice qualities with association to the compromise in the musculoskeletal behavior and insufficient airflow for phonation.

Table 5: Results description of the protocol application of the speech basic motor processes

BASIC MOTOR PROCESSES OF SPEECH	CHARACTERISTICS PRESENT IN THE PATIENT
Articulation	-Reduction in coordination and agility in orofacial mobility. -Imprecision in the articulatory production of phonemes and symphons. -Reduced speech intelligibility

Phonation	<ul style="list-style-type: none"> --Perceptual appreciation of aggravated pitch. -Weak timbre quality with mild-moderate severity. -Decreased vowel intensity in conversational-projected voice. -Weak vocal attack. -Other laryngeal functions: weak cough and laughter; frequent throat clearing. -Moderate degree of dysphonia. -Reduction of muscular control of laryngeal structures. -Hypertonia of facial, peri-extra laryngeal, trapezius, scalene, and paravertebral musculature.
Breathing	<ul style="list-style-type: none"> -Superior costal respiratory type. -Oral-oral respiratory mode at rest. -Phonorespiratory incoordination. -Decrease in respiratory frequency. -Decrease in the duration, quality, and strength of the expiratory murmur. -Phonorespiratory impairment in function of speech. -Decrease in speech comprehensibility and acceptability.
Fluency	<ul style="list-style-type: none"> -Speech with monointensity, monotone, bradylalias and inadequate silences. -Speech rate difficulties. -Imprecision in automated series.
Resonance	<ul style="list-style-type: none"> - Emissions of nasality. -Posterior guttural resonance. -Decreased mobility of the soft palate.

4. COGNITIVE-COMMUNICATIVE DIAGNOSIS

When analyzing the results of the initial evaluation, it is established that the patient presents a moderate neurocognitive disorder characterized by a deterioration in global functioning due to compromises in the attentional processes, encoding memory, evocation, work, and executive functions.

In relation to the language process, a limited capacity in phonological and word semantic emission, sentence length, agility in oral production, grammatical form with limited lexical access, and lack of variations in paralinguistic, kinesic, and proxemic nonverbal resources, which hinders the communicative exchange process with the interlocutor. Likewise, compromises at the comprehensive reading level in its judgment-critical and automatic level in the reading speed process. In addition, in writing due to limitations in the graphic motor component.

In the speech area, there is evidence of a disorder in the basic hypokinetic central origin processes of moderate degree due to compromises in the articulatory process, vocal dysfunction, hyper-nasality, and dysprosody that negatively influence family and social interaction and life quality.

5. COGNITIVE-COMMUNICATIVE REHABILITATION PROGRAM

The design of the cognitive-communicative rehabilitation program was based on the systemic approach review that applies a method that makes it possible to unite and organize knowledge from different disciplines independently with the intention of achieving effectiveness in care involving the person, family, and society (Minsocial, 2010 as cited in Angarita, 2014). Therefore, the care required in the person with PD implies a global orientation with linear interdisciplinary objectives adjusted to the particular needs of the individual to improve the life quality, inclusion, and comprehensive habilitation/rehabilitation of the patient (Agudo et al., 2021 and Vallés and Bayés, 2014).

Thus, the intervention program was aimed at promoting cognitive-communicative functions through the therapeutic strategies application based on a comprehensive approach. For this, a weekly interspersed work schedule was organized for the three cognitive neurorehabilitation therapies development and two language and speech sessions with an intensity of 1 hour daily respectively, in an execution time of 12 months, for a total of 237 therapeutic interventions.

Cognitive-communicative rehabilitation covered different strategies and methods implemented in neuro-rehabilitation therapies based on the integral stimulation program review by Tarragá and Boada (2012) and the general principles for the cognitive impairments intervention by Peña (1999) based on the brain neuroplasticity presence and cognitive neuropsychology, aimed at favoring basic functionality and maintaining the patient's autonomy. Likewise, it was supported in the restoration processes, compensation, and global cognitive functioning optimization to improve the performance of information processing slowing, attention deficit, executive functions alteration, visuospatial compromises, memory difficulties, language and speech dysfunction adjusted to the needs of the patient (Ojeda et al, 2012 as cited in Sanchez et al., 2020).

The treatment plan content was established according to the cognitive impairment level, in particular the patient case of moderate degree addressing the basic mental abilities of attention, orientation, and memory, in their different types. In addition, the more elaborated and complex ones, such as visuospatial gnosias, manual praxias, reading-writing, calculation, and mathematical reasoning were worked on later, through individual exercises appropriate to different complexity levels, maintaining in the development of the interventions a harmonious atmosphere that will facilitate the therapist-patient interaction, validating the progress and minimizing the patient's mistakes. In the execution of the therapeutic sessions, each module aspect was worked integrally with the establishment of specific short-term objectives subject to the patient's evolution that allowed to advance and/or execute reinforcement activities in which the caregiver was involved in the daily training. Likewise, the work of the areas was directed and executed by the professionals in neuropsychology and speech therapy according to their performance competence, making an integral contribution to the cognitive-communicative rehabilitative treatment.

In the orientation module, we worked with the purpose of knowledge capacity improving the spatial and temporal environment related to attention, recent memory, autobiographical knowledge, and projection of the future through the reality orientation therapy-TOR of Folsom (1958) in sessions and

in 24 hours reviewed and applied by Peña (1999) as a set of techniques through which patients become aware of their situation in time and space.

In the memory module, it was addressed through reeducation and stimulation techniques related to previous memory strategies for patients with moderate impairment reviewed by Tárraga, 1998 as cited in Díaz and Sosa, 2010. Norris's (1986) reminiscence therapy proposes to recall memories of the subject's personal history, stimulate the memory process, with reactivation of the past, and maintenance of his or her own identity and self-psychic orientation. In the same sense, the spaced retrieval technique was used to support the work, which allows access to the memory in time intervals, prolonging it to improve the implicit memory in the object names learning, name-face, and object-place associations; the method of blurring the retrieval cues progressively by means of given cues for accessing information of semantic associations; and the learning paradigm with the least number of errors by training with strategies and techniques in the daily forgetfulness solution for prospective and retrospective memory applied by Tárraga (1998) and Maroto (2003).

In the attention and concentration module, the attentional level was treated by means of gnostic/perceptual support with the sensory activities application by Peña (1999) supported by the reminiscence therapy used by Tárraga (1998), which makes possible the increased activation of the concentration-time span supported by the patient's personal instruments that allow favoring cognitive and social stimulation.

In the language module, the linguistic-communicative process was addressed through training and communication techniques use, validation therapy, and conversational routes analysis aimed at a positive human interaction for the patient to enhance functional possibilities due to motor/sensory, verbal, and non-verbal communication (Peña, 1999 and Tárraga, 1998). Likewise, the intervention was supported by the application of direct, indirect, educational, provided, compensatory and connecting communication strategies resulting from the care practice for moderate cognitive impairments through oral/written and nonverbal language stimulation methods to facilitate communicative interaction in activities of daily living (López, 2014).

In the praxis module, emphasis was placed on the manipulative praxis capabilities through gestural production, order, and imitation, promoting the active reception-comprehension system of the visual-verbal order, abstraction semantic level, mental representation of the gesture with executive sequential components, spatial coordinates manipulation and the motor system of the task in execution for instrumental daily life activities (Peña, 1999, Sarmiento, 2013).

In the executive function module, the ability to organize sequences of behavior was stimulated, orienting it toward the desired goal achievement based on the basic principles for the executive functions treatment (Delgado and Etchepareborda, 2013). Likewise, the skills initiation, planning, cognitive flexibility, verbal fluency, regulation and inhibition of behavior, abstract reasoning, and self-awareness of the disease through different cognitive stimulation methods of self-instructions, problem-solving, behavior modification, social skills, environment adaptation in the daily living activities (Arango and Parra, 2008, Sarmiento, 2013). (Arango and Parra, 2008, Sarmiento, 2013).

In the calculation module, arithmetic processing was encouraged at the structuring numerical level and mathematical skills through problem-solving strategies of buying and selling in which money management is involved with the mental calculation exercise, attention, and concentration systems in daily life activities (Tárraga & Boada, 1998).

In the speech module, treatment was implemented for basic motor processes through Duffy's (2005) global rehabilitation of differentiated symptoms according to the patient individual characteristics with a rehabilitation sequence adjusted to the aspect needs that require greater benefit for the person's intelligibility with PD based on training for vocal hygiene, relaxation, breathing, vocal therapy, phono-respiratory coordination, and articulatory control to achieve greater communicative functionality maximizing the effectiveness and naturalness of communication. (Agudo et al., 2021, Vallés and Bayés, 2014).

In the interdisciplinary support module, it was determined the accompaniment through the approach of interdisciplinary objectives by physiotherapy, psychology, and occupational therapy services to support the cognitive work of global functioning in the psychoemotional, motor, balance, and posture state (Márquez et al., 2021, González, et al., 2021, López et al., 2021, Cosculluela and Bayés, 2014).

In the general recommendations module, a series of advice was established for the person close environment with PD to maintain the patient's global cognitive-communicative functional abilities in daily life with support from the caregiver (Vallés and Casanovas, 2004, Bayés et al., 2008 and Chueca, 2009).

Table 6: Intervention modules and therapeutic strategies of the cognitive-communicative rehabilitation program

INTERVENTION MODULES	THERAPEUTIC STRATEGIES
ORIENTATION	<ul style="list-style-type: none"> -Exercises of daily temporal orientation in the recent aspects of date of the day, month, year, hour, and season of the year. -Exercises of knowledge and memory of holidays of the year (traditional, personal, and family). -Annual, monthly, weekly, and daily planning exercises. -Exercises of semantic and cultural knowledge about time. -Exercises of spatial orientation of place and general geographic orientation on maps. -Exercise of displacement in the local geographic environment and orientation in one's own home.
ATTENTION AND CONCENTRATION WITH	<ul style="list-style-type: none"> -Exercises of visual reminiscences of images, superimposed-naming; recognition-pairing of faces/figures description of the descriptive characteristics of objects and of the spatial environment.

GNOSIC/PERCEPTUAL SUPPORT	<ul style="list-style-type: none"> -Object-color-word matching evocation exercises. -Discrimination exercises of graphic elements and figures. -Auditory reminiscence exercises of discrimination-recognition and naming of sounds; sound-picture-word matching and selective attention. -Tactile reminiscence exercises of identification/comparison of textures and materials. -Exercises identification / naming and comparison of geometric shapes / objects; and tactile, olfactory and gustatory association.
MEMORY	<ul style="list-style-type: none"> -Memory exercises of the book of life. -Exercises of reminiscence from conversations. -Exercise of the creation of the box of memories. -Exercises of creation of the line of time. -Exercises of thematic and personal reminiscences. -Exercise of elaboration of a diary of activities. -Exercises of episodic and semantic memory of traditional and family celebrations. -Exercises of telephone numbers and orders.
EXPRESSIVE AND COMPREHENSIVE LANGUAGE	<ul style="list-style-type: none"> -Exercises of repetition of syllables, pseudo-words, words, phrases of increasing complexity. -Exercises of naming images and/or objects of semantic fields. -Exercises of executive lexical and semantic tasks. -Comprehension exercises with semantic fields, simple and complex orders with logical-grammatical relations. -Conversation-narration exercises with different topics. -Exercises of conversation-description of thematic sheets of different semantic domains. -Exercises of execution of actions, verbal and written tasks.
LANGUAGE LECTURE-WRITING	<ul style="list-style-type: none"> -Exercises of grapho-motor skills and graphemes. -Reading-writing exercises of phoneme-grapheme, syllable, pseudo-words, words and phrases by copying and dictation. -Exercises of categorical naming of written form of semantic categories, -Semantic grammatical writing exercise/written narration. -Reading comprehension exercises of words, sentences and texts of different complexity.
NON VERBAL LANGUAGE	<ul style="list-style-type: none"> -Exercises of imitation of facial movements of the therapist and by means of cards. -Eye contact maintenance exercises. -Exercises of conversational turns. -Exercises of tone inflections to express feelings.

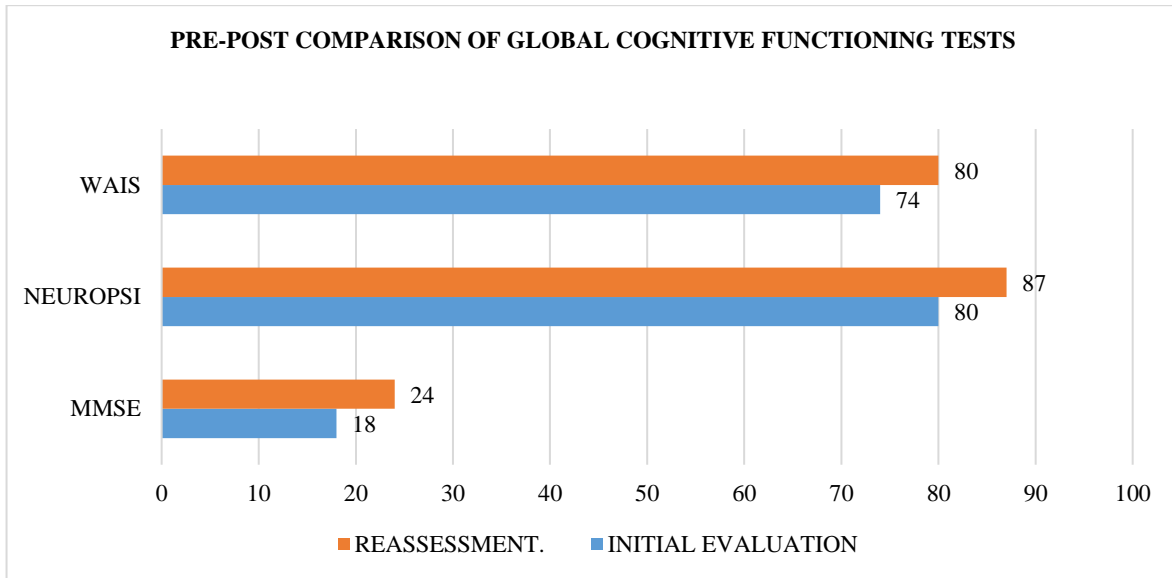
	<ul style="list-style-type: none"> -Exercises of gestural and manual support in conversation. -Comprehension exercises with gestural support and head movements. -Proxemic exercises in the communicative act. -Exercises of conversational skills in oral discourse. -Exercises of metalinguistic skills in theory of mind.
CALCULATION	<ul style="list-style-type: none"> -Exercises of number knowledge and counting skills. -Quantity reading and writing exercises. -Exercises of mathematical calculation with basic operations. -Exercises of rationing and arithmetic problem solving. -Exercises of knowledge and handling of money in daily life. <p>PRAXES</p> <ul style="list-style-type: none"> -Exercises of gestures of communication from orders and by imitation. -Exercises of manipulation of objects and gestures based on verbal commands. -Exercises of manual dexterity by manipulation of objects. -Exercises of graphic constructive praxias. -Exercises of constructive manipulative praxias.
PRAXES	<ul style="list-style-type: none"> -Exercises of gestures of communication from orders and by imitation. -Exercises of manipulation of objects and gestures from verbal orders. -Exercises of manual dexterity by manipulation of objects. -Exercises of graphic constructive praxias. -Exercises of manipulative constructive praxias.
EXECUTIVE FUNCTIONS	<ul style="list-style-type: none"> -Exercises of initiation and sequencing. -Exercises of self-regulation of behavior. -Exercises of behavioral disinhibition. -Exercises of consciousness of the disease. <p>Exercises of sequential, non-comparative lexicosemantic relations, abstraction of similarities, understanding of effects of actions and identification of chance/solutions.</p> <ul style="list-style-type: none"> -Rationalization and judgment exercises. -Abstraction exercises of popular proverbs and sayings.
SPEAKING	<ul style="list-style-type: none"> -Vocal hygiene guidelines. -Progressive relaxation exercises of the phonatory musculature. -Breathing training exercises. -Exercises of posture and phono-respiratory control. -Exercises of control and movement of the vocal cords for stabilization of the variations of the vocal qualities and glottic closure. <p>Exercises of the semi-occluded vocal tract.</p> <ul style="list-style-type: none"> -Exercises of resistance in water. -Exercises of facilitating techniques. -Exercises of phono- respiratory coordination.

	<ul style="list-style-type: none"> -Isotonic, isometric, and isokinetic orofacial practical exercises. -Strengthening exercises of the orbicularis oris and lip sphincter closure. -Articulation exercises of positioning and phonetic derivation, minimum pair contrasts and compensatory strategies. -Velopharyngeal closure control and mobilization exercises. -Overexertion exercises, speech rate changes and over-articulation. -Accentuation and intonation exercises.
INTESDISCIPLINARY SUPPORT	<p>Physiotherapy: Enhance mobility, coordination, balance, gait and posture to maintain and/or restore the patient's autonomy.</p> <p>Occupational therapy: To maintain the arc of wide and rhythmic articular movement for the manual skills necessary for the handling of instruments and execution of daily activities.</p> <p>Psychology: Intervene individually and family psychological and neuropsychiatric mood, anxiety and psychotic symptoms that impact the patient's quality of life.</p>
GENERAL RECOMMENDATIONS	<ul style="list-style-type: none"> - Social and recreational activities. -Family activities. -Personal and hygiene activities. -General recommendations for communication, mobility and emotional state.

6. THE REEVALUATION AND EVOLUTION RESULTS OF THE THERAPEUTIC PROCESS

Figure 1 shows the performance of the patient's cognitive functioning after the comprehensive rehabilitation program application. The results indicate a slight significant increase in the performances scores that establish an improvement determined by cognitive deterioration transfer tending to a change of severity from moderate to a mild-moderate degree in the tasks of global cognitive functioning determined by a self-awareness better activation state and in relation to his family and social environment by the progress in the attentional processes integration, perception and memory when performing comprehension-expression tasks that require processing and abstraction of the information.

Figure 1: Pre-post evaluation comparison of global cognitive functioning



In the communicative process evolution, some compensation in the movements of the orofacial-phonatory musculature, inconsistent changes in the qualities of the voice, articulatory pronunciation with better intelligibility and verbal fluency with progress in the oral and nonverbal resources use for a more effective communicative interaction allowing the linguistic behavior to advance in a notoriously functional way for the achievement of needs manifestations, desires, and interests in the communicative exchange with his family participating progressively in the daily life activities.

7. DISCUSSION

The rehabilitation program was aimed at favoring cognitive-communicative skills through the intervention strategies application based on an integral approach to achieve functional compensation to improve the patient's life quality. Thus, the intervention programs development should be adjusted to the symptomatology and progress of the disease adapted to the particular subject's characteristics based on neuropsychological rehabilitation methods based on scientific evidence such as spaced recovery, coding facilitation, access to information, analysis of conversational breaks, cues blurring, learning paradigms and the pedagogical approach aimed at the cognitive functions of memory and language (Tárraga, 1998 and Francés et al., 2003).

Along the same lines, cognitive stimulation therapies, reality orientation, reminiscence, cognitive motivations, context conditioning, and external aids (Martínez, 2002). Likewise, the support of the work described in the practical guides proposals of health centers establishes global methodologies that help therapeutics to evolve autonomous performance with family well-being. (Ledesma, 2017). Therefore, intensive cognitive rehabilitation therapies apply different techniques, tools, and methods that have proven to be safe and feasible for patients with PD due to the benefits provided by exercises on non-motor symptoms such as cognition (Quinzaños and Perez, 2020).

In this sense, to the integral rehabilitation in PD are added the proposals of global methods for the motor deficits work that limit the basic speech processes and oral/non-verbal communicative resources that are an important part of the interdisciplinary speech therapy intervention, such as the communication and validation techniques that are applied directly and indirectly in the therapy sessions for the reintegration of speech and language production behavior. As well as in the family context in which the caregiver becomes a speech and language production behavior facilitator in the family context. Directly and indirectly in therapy sessions for speech and language production behavior reintegration. And in the family context in which the caregiver becomes a facilitator in the communicative interaction by adaptation. It is provided to the environment according to the cognitive impairment degree of the patient. (Duffy 2005, Peña, 1999 as cited in Díaz and Sosa, 2010).

Now, the effectiveness of the therapeutic process implementation is determined by a balance in the influence of the different factors such as the severity degree, clinical form, pharmacological treatment, disease evolution, age, and socioeconomic aspect. As well as, the optimal interpersonal relationships of the family for the accompaniment in the mediation strategies in which the family nucleus contributes significantly to the patient adopting an adequate awareness and acceptance of the PD processes along with the motivation for the possible progress without creating complete rehabilitation false expectations if not directing efforts to improve their life quality on a daily basis and on carrying the disease in a functional way (Glozman, 2013).

8. CONCLUSIONS

In general, the implementation of the cognitive-communicative rehabilitation program based on a comprehensive approach determined its effectiveness by the progress in the patient's quality of life reflected in the qualitative and quantitative results of the determinant indicators of global cognitive-linguistic functioning despite the normal gradual deterioration of people with PD. Likewise, the individualized rehabilitative organization treatment adjusted to the patient's particular needs according to the deterioration degree and the daily linear progressive execution form with interdisciplinary support and family mediation significantly influenced the change in the complexity of the symptomatology in cognitive-communicative activity. In the same sense, some positive factors observed in the interventions development of the disease acceptance by the family-patient, optimal family interpersonal relationships, motivation reflected by the desire to overcome, permanent accompaniment and commitment of the caregiver contributed and added to the progress of the patient's rehabilitation process, achieving a better biopsychosocial and family development.

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