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Evaluation of the effects of a cognitive and neuromotor stimulation program for a group of elderly people with major neurocognitive disorders

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Abstract. The objective of this study is to analyze the neurocognitive decompensation processes in elderly people upon entering care centers and one year after their integration into special programs designed to limit the effects of Alzheimer's disease and other neurodegenerative diseases. This scientific research will observe the limitation, progression or regression of these types of diseases. Following this study, the major risk factors were identified, group and individual therapies were implemented and the needs of the elderly were determined in order to optimize their neurocognitive functions and increase their quality of life.

Keywords. elderly people, Alzheimer's disease, neurocognitive disorders

1.1. Theoretical references

In Romania, on January 1, 2020, people aged 65 and over numbered 3,664,411 and represented 19% of the country's resident population (19,317,984), according to data published by the National Institute of Statistics. (INS)

People's perception of their own health is influenced by a complex set of factors, including environmental, cultural and socioeconomic conditions. It's no surprise that as one gets older, their perception of being healthy declines — this is true for both men and women.

Analyzing different age groups, it can be seen that in 2018, among people aged 16 to 44, 86.3% of women in the EU considered their health to be good. 88.3% of men had the same perception of their own health.

The percentage was lower for people aged between 45 and 64 (64.5% of women and 67.3% of men) and people aged 65 and over (36.5% and 43.1 %). In almost all EU states, the percentage of men who considered their health to be good was higher than the percentage of women who had the same perception of their own health and the difference increased with age. It is also interesting to note that the differences between the member states increased with age. (National Institute of Statistics, Romania 2020)

In Romania there are around 35,000 patients with dementia, but the Romanian Alzheimer Society estimates that more than 80% of cases remain undiagnosed. *In 2012, dementia was declared a public health priority by the World Health Organization.*

This highlights the fact that dementia is a frequent and severe disease. There are more than 35 million people with dementia worldwide, 25% of whom live in Europe. Western Europe is the region with the highest number of people affected by dementia: 6,975,540 (World Health Organization).

Global prevalence among the elderly has been estimated at 10-13%, and the rate increases exponentially with age: 47% of those aged 85 and older. It should be noted that, in general, many cases of dementia remain unidentified.

The role of compensatory therapies for this category of patients becomes a priority, although at the moment in Romania this field is taking shape as a set of activities carried out within public medical and social services.

Studying the processes of cognitive decompensation, discovering, shaping and adequately exploiting the skills and capacities of each person is favorable for their mental stability. Individual abilities, motivation, self-image, family, social integration and professional success are factors that intertwine, influence each other, and join in different interdependent systems in order to determine the optimization of the quality of life for the elderly.

“Over the past two decades, a new body of knowledge has emerged that seeks to understand the psychosocial aspects of dementia and Alzheimer’s disease (AD).

Such knowledge mainly focuses on comprehending the lived experience of individuals living with dementia as well as that of their formal and informal caregivers.

The evidence that transpires supports the development and implementation of a number of psychosocial interventions aimed at enhancing the quality of life in such individuals and in those who are likely to be impacted by this neurodegenerative syndrome—namely informal and formal caregivers.”(Scerri C., Abela A., Scerri A., (2021)

Effective processing of multisensory stimuli relies on both the peripheral sensory organs and central processing in subcortical and cortical structures. As we age, there are significant changes in all sensory systems and in a variety of cognitive functions. Visual acuity tends to decrease and hearing thresholds generally increase (Kalina 1997; Liu and Yan 2007), whereas performance levels on tasks that rely on motor speed, executive function, and memory typically decline. (Rapp and Heindel 1994; Birren and Fisher 1995; Rhodes 2004)

There are also widespread changes in the aging brain, including reductions in the volume of gray and white matter (Good et al. 2001; Salat et al. 2009), alterations in neurotransmitter systems (Muir 1997; Backman et al. 2006), regional hypoperfusion (Martin et al. 1991; Bertsch et al. 2009), and altered patterns of functional activity during cognitive tasks (Cabeza et al. 2004; Grady 2008). Given the extent of age-related alterations in sensation, perception and cognition, as well as in the anatomy and physiology of the brain, it is not surprising that multisensory integration also changes with age. (Mozolic JL, Hugenschmidt CE, Peiffer AM, Laurienti PJ. in Murray MM, Wallace MT, 2012)

1.2. Diagnosis elements in major neurocognitive disorders

The nature of the cognitive and neurobiological alterations associated with age-related change is substantially different from that seen in the early stages of a dementing illness, such as Alzheimer's disease. Albert, M. S. (1997). Major neurocognitive disorder manifests as a spectrum of cognitive and functional deficits. The cognitive decline of the elderly is defined by:

- “a decrease in functionality in short-term memory,
- delay in accessing stored data,
- loss of sustained attention and motor perception skills,

• a decrease in executive function, problem solving and speed of performance". (Petersen 1992; Craik 1990; Rapp & Heindel 1994)

People with major neurocognitive disorders (NCD) present criteria A cognitive deficits, but also accentuated and severe criteria B as follows:

- severe deterioration in social, professional and family functioning,
- failure to remember recent conversations, current events, faces and names of close people,
- failure to remember personal information,
- changes in affect and behavior,
- hallucinations, delirium and states of anxiety,
- deterioration of judgment and impulse control, lack of self-determination and self-service capacities.

The elderly diagnosed with major NCD lose their autonomy, they need caretakers to offer them continuous supervision and help with their day-to-day activities.

Mild and major neurocognitive disorders

In the neurocognitive disorder, mild memory deficits cause the elderly to carry out, with effort or through adaptation methods, the daily activities indispensable to life, without influencing independence in terms of managing financial resources and goods or administering medicine. (Eysenck & Eysenck, 1998)

Alzheimer's disease

The typical clinical picture of Alzheimer's disease is characterized by amnesia, impairment of short-term memory and immediate memory, impairment of learning capacity, executive function deficits, aphasia, apraxia. The average life span from the onset of Alzheimer's disease is about 10 years. In the terminal stage of the disease, individuals are bed-ridden, develop mutism and lose the ability to chew and swallow food.

The psychopathology of the elderly is not approached to an appropriate extent in the psychological research in Romania, despite the fact that the emergence of specific symptoms (first signs of depression and even dementia) occurs at an early age (in people just over 50 years old). This phenomenon leads to a drastic decline of the quality of life of those individuals, and accelerates their disengagement from professional and social positions and roles. (Giurgiu, R. L., & Călin, M. F., 2017).

The results of a research made by Sălceanu C. and Sandu M. (2019) "show a significant positive correlation between religious feelings and self-esteem. The results are supported by both the confirmed hypotheses above, as well as by other studies. Self-esteem allows certain action dispositions, like action instead of running from life, respect the facts rather than avoid or deny them. Negative emotions and personality disorders in old age people. Emotional development in elderly people is characterized by a series of specific traits:

- Increased reactivity to all environmental changes and a tendency of denial;
- Primitive emotional manifestations, an increase in emotional instability;
- Living a feeling of self-satisfaction, related to both personal achievement and family members achievements;
- An increased emotional distress that comes mainly after the death of the life partner;
- Anxiety, frustration, and depression become stronger and long-lasting;

•Inhibition, pessimism, negativity, feelings of futility, marginalization, persecution, irritability or dissatisfaction that may lead to arrogance and contempt” (Sălceanu, C., & Sandu, M. L., 2019)

2. Clinical Study

2.1. Study objectives

The objective of this study is to analyze the neurocognitive decompensation processes in elderly people upon entering care centers and one year after their integration into special programs designed to limit the effects of Alzheimer's disease and other neurodegenerative diseases. This scientific research will observe the limitation, progression or regression of these types of diseases. Following this study, the major risk factors were identified, group and individual therapies were implemented and the needs of the elderly were determined in order to optimize their neurocognitive functions and increase their quality of life.

The pandemic caused by the Sars-Cov virus had a major impact on the state of comfort and assessment of the elderly, which led to the limitation and restriction of freedom of movement, the reduction of communication and social interactions, the popularization of unjustified and unfiltered information in the mass media intended to create panic among the elderly. The research was carried out in two Residence Centers in Constanța county, Romania, between March 2020 and April 2021.

2.2. Description of the group of participants

The group of participants is composed of 70 institutionalized seniors in the two Residence Centers in Constanța County, Romania. All study participants are diagnosed with mild and major neurocognitive disorders caused by the neurodegenerative diseases Alzheimer's, Parkinson's, and other types of dementia. The participants in this study are aged between 65 and 96 years, most with preserved locomotor capabilities, but with mild or major neurocognitive disorders.

2.3. Application of the clinical study

Research tools

1. MMSE (Mini-Mental State Examination). The Romanian version is one of the most used screening tools for the assessment of the deterioration of cognitive capacities. The standard version (VS) includes the following activities: comprehension, spatial and temporal awareness, attention and calculation, naming, repetition, reading, writing, drawing, memorizing.

2. MADR-S (Montgomery-Asberg Depression Rating Scale).

The assessment was based on a clinical interview that aimed to address 10 themes: apparent sadness, reported sadness (mood), restlessness, sleep, appetite, ability to concentrate, ability to take initiative, emotional engagement, pessimism, suicidal thoughts.

2.4. Analysis and processing of results

Hypothesis 1. It is assumed that through individual and group programs aimed at eliminating emotional blockages, the degree of depression of institutionalized elderly people decreases.

We followed the comparison of the results obtained by applying the MADRS interview in 2020, on the date of institutionalization, and in 2021, one year after the date of institutionalization. Ten traits of elderly people with neurocognitive disorders were evaluated:

apparent sadness, reported sadness (mood), restlessness, sleep, appetite, ability to concentrate, ability to take initiative, emotional engagement, pessimism and suicidal thoughts.

Concerning the group of 70 elderly people diagnosed with neurocognitive disorders, when assessing the severity of the degree of intensity of depression symptoms of the institutionalized elderly for the year 2020, those who were included in the sample group obtained an average of 20.13 with a standard deviation of 8.46. On the other hand, in 2021 an average of 14.50 was obtained, with a standard deviation of 5.58, $\text{sig} < 0.5$ which validates the hypothesis that through individual and group programs aimed at eliminating emotional blockages, the level of depression in institutionalized elderly decreased.

Hypothesis 2. It is assumed that through individual and group programs aimed at cognitive stimulation, the mental and cognitive capacities of the institutionalized elderly are maintained or slowly progressed (comparison between the cognitive capacities of 2020 and those of 2021).

For the second hypothesis, the aim was to compare the results obtained through MMSE-2 by the 70 elderly people diagnosed with neurocognitive disorders when applied in 2020, on the date of institutionalization, and later in 2021.

For the evaluation of the mental and cognitive capacities of the institutionalized elderly (comprehension, spatial and temporal awareness, attention and calculation, naming, repetition, reading, writing, drawing, memorizing) a significant difference emerges between the year 2020 and the year 2021 in regards to the MMSE test, which validates the hypothesis according to which the mental and memory capacities of the institutionalized elderly are maintained or slowly progressed due to cognitive stimulation. The MMSE test showed an average of 16.9 with a standard deviation of 2.37 in 2020, whereas in 2021 an average of 17.9 was obtained with a standard deviation of 2.00, $\text{sig} < 0.5$.

2.5. Conclusions

The main objective of this study is to demonstrate that the process of cognitive decompensation in institutionalized elderly can be slowed down by identifying the risk factors and optimizing an individualized action plan and continuous monitoring, which in turn facilitates the integration and maintenance of the elderly in active life. We aim to identify the risk factors and the degree of autonomy through individual multidimensional assessment of the elderly which are to be institutionalized.

Institutionalization in elderly care centers is recommended, as they have individualized programs that cater to their needs such as medical therapy, group and individual therapy, socialization activities, an appropriate diet for patients exhibiting diseases associated with Alzheimer's disease, a secure environment and continuous supervision so that they do not injure themselves or fall victim to environmental accidents.

In the context of institutionalization of the elderly in care centers, a slowdown in the evolution process of the disease was observed.

The study was carried out during the year 2020-2021, and during this time several stages were completed, starting from the anamnesis of the elderly, the identification of medical and psychosocial needs, the creation of programs and therapies to stimulate active life, improve cognitive capacities and remove emotional blockages. This study demonstrates that through the application of psycho-social programs, medical therapies and nutrition that is consistent with the diagnosis, the degree of satisfaction and emotional comfort of institutionalized elderly people increases.

This gives the resident a sense of safety, confidence and usefulness, which leads to the fulfillment of the common goal of providers and beneficiaries of social services alike. Namely, to increase the quality of life.

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