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BRAIN ACADEMY – COGNITIVE EXERCISES FOR ELDERLY PEOPLE)

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Abstract: In recent years, Brazil has become a country with a large number of elderly people, which has led to the need to promote healthy habits for active and healthy aging and maintenance of cognitive functions. In this sense, we created the Brain Academy extension action in 2015, which seeks to develop actions to improve cognitive impairment and dementia in the elderly population. Many studies have shown positive effects of cognitive exercise in delaying or preventing these conditions. Brain gym exercises include motor skills activities, crossword puzzles, logical reasoning and physical exercises that involve movements of the head, eyes and crossing of extremities to stimulate both cerebral hemispheres. In this study we evaluated the effect of 12 weeks of brain gym exercises on cognitive function in elderly people. The study involved 64 elderly people of both sexes. The elderly participated in 50-minute brain gymnastics sessions once a week and received a notebook to develop cognitive activities at home, with a time stamp. The results were measured by the time spent performing the exercise at home and cognitive function was assessed by the Mini-Mental State Examination (MMSE) questionnaire. The results were evaluated at baseline and after the intervention. Logical reasoning time increased by 34% of elderly participants, with the MMSE score being significant for the study population. We found that the Brain Academy exercise sessions significantly increase cognitive reasoning and perception in the elderly. With this work, it is possible to suggest that brain gym exercises are a great strategy to help control and activate cognitive abilities, as well as being a preventive factor in the deceleration of neurocognitive diseases.

Keywords: aging, elderly, cognitive exercises

INTRODUCTION

The increase in the number of people in the age group related to old age has become an inherent phenomenon in the main societies of the world. With the increasing improvement in quality of life and the advancement of science related to the control of diseases related to mortality, life expectancy has increased (Matsudo et al., 2000). Statistical projections for the year 2015 are that Brazil will be ranked as the sixth country in the world with a population aged 60 years (Shoueri-Junior, 2000). The increase in life expectancy shows that people tend to become less active, their physical capabilities decrease and psychological and social changes arise, such as: the feeling of being old, stress, depression and the appearance of dementia. The modification of world demographic maps has demonstrated that there has been a change in the age distribution of the population, with the population now having a larger number of people in the 60-year-old age group. Demographic projections have shown that the population of Latin America could increase by 3.2 times, reaching a population of 240 million elderly people. One of the consequences of this increase in the population of elderly people is that a large part of the population will have difficulty performing tasks involving executive functions and memory, which requires preventive actions so that elderly people can remain healthy and independent, thus helping to reduce costs in health systems. (Jagust et al., 2013; Maresova et. al., 2015) In 2016, the elderly population aged 65 and over reached 10.15%; It is estimated that the population will exceed 1 million people by 2024 because of rapid population aging. One of the main factors that increase the risk of developing dementia is age, with people aged 75-79 years it is 5.8 times, and among those aged 80-84 years it is 17.5 times higher than those aged between 60 and 64 years old (kim

et al, 2016). Decline in cognitive function is a common phenomenon that occurs with age. Most elderly people experience age-related cognitive decline and therefore worry about the possibility of senile dementia as cognitive decline develops. Even if cognitive decline insignificantly affects an elderly person's life, it can still influence their quality of life. life, the frequency and quality of interactions (Mahncke et al., 2006).

Cognitive changes represent one of the greatest challenges to be faced, both in the scientific and public policy spheres (BRASIL, 2011, Gheysen, 2018). Cognitive changes can affect the functionality of elderly people and represent the biggest cause of dementia in this age group, both in developed and developing countries, and are also responsible for the loss of decline in cognitive function, which can seriously compromise the individual's autonomy. (WHO, 2001). Cognitive impairments include dementia which has been considered the leading cause of disability and mortality. Worldwide, 47 million people live with some form of cognitive decline and the incidence is expected to triple by the year 2050 (WHO, 2015). In the aging process, it has been found that 15% of people may develop some initial type of cognitive disability. Of the overall total, around 5% of elderly people aged 65 or over may develop greater degrees of cognitive decline, which can lead to dementia (Laks et al, 1995). It has been well described in the literature that executive functions play an essential role in the independence function of the elderly. However, executive functions, such as coordination skills, motor skills and maintaining finances, can be altered with the use of medication (Cahn-Weiner et al, 2000; Bell-McGinty, 2002). Cognition-based interventions do not have a universal definition, these include cognitive training, cognitive stimulation, rehabilitation, cognitive enrichment and cognitive exercise

(Reijnders et al, 2013). In general, the ultimate goal of cognitive training and rehabilitation is to prevent dementia and cognitive decline, reduce the rate of cognitive decline, recover patients' functions, or effectively respond to disease progression (Walton et al., 2014). Cognitive stimulation, on the other hand, is based on the general view that a lack of cognitive activity accelerates cognitive decline. Cognitive stimulation is often discussed in the context of normal aging as well as dementia. Cognitive stimulation can be an effective intervention for people with dementia, offering them a range of enjoyable activities that stimulate their thinking, attention and memory, usually in a social setting (e.g. a small group) (Woods et al., 2012, Streater et al 2016). Cognitive stimulation programs (PsEC) can help maintain or improve cognitive functions, particularly among healthy community-dwelling older adults, who are a risk group for cognitive decline (Sherman et al., 2017; Gates et al. 2011). In particular, (PsEC), which combine cognitive, emotional, and physical activities using multiple elements (e.g., music, art, and tactile sensation), can stimulate diverse aspects of cognitive function, making them more effective than single-component programs. Furthermore, they have the advantage of arousing more participants' interest and encouraging more active participation (Tesky et al., 2017). As we age, cognitive decline may occur. It is known that improving the performance of cognitive functions in the elderly has important consequences for their quality of life. The literature suggests that training can improve cognitive functions in healthy elderly people (lira et al, 2011). It has been demonstrated in the literature that there is the possibility of avoiding or postponing such deficits with preventive actions, or even reversing them, when already installed, through therapeutic interventions of multisensory, motor and

cognitive stimulation (Oliveira et al 2014) This positive response stimulation is an important demonstration of the persistence of brain plasticity in institutionalized elderly people, consistent with the concept of cognitive reserve (Morrison et al., 2012).

Montessori in 1958 developed material to allow children to learn subconsciously through fun and stimulating activities that can be categorized according to Piaget's stages. An understanding of the development and acquisition of cognitive skills in children is useful for adapting activities in the final stages of dementia. The Montessori approach increases the self-esteem of individuals suffering from dementia and helps them experience fulfillment through activities adapted to their abilities in a positive environment. The Montessori material would therefore allow people with dementia to use their residual cognitive abilities unconsciously to better interact with the environment and have a more positive effect. Authors such as Orsulic-Jeras, Schneider, Camp, Nicholson and Helbig (2001) tested the use of the Montessori approach in people with moderate to severe dementia. According to them, this approach can respond to the skills and needs of this clientele, as it proposes structured, simple and attractive material that can be modified as necessary to suit the skill level and allows for self-correction. Researchers such as Camp and Mattern (1999) as well as Camp, Orsulic-Jeras, Schneider, & Diggs, 1999; found that in the final stages of dementia, cognitive skills are lost in the opposite order in which they are developed in childhood. More specifically, the aspects of cognitive development identified by Piaget demonstrate that the earlier a child develops cognitive skills, these are also the last to be lost due to Alzheimer's disease. As an example, we can describe that the first cognitive losses are related to abstract reasoning while object permanence and the ability to recognize

oneself are among the last losses observed (Van Haitsma, 2000). Thus, according to these same authors, the most appropriate activities for people with Alzheimer's dementia are those associated with Piaget's stages of development, corresponding to their cognitive abilities. The elderly population in Uberlândia increased by 63.9% in the last ten years. Of the 604,013 current inhabitants registered in the municipality, 61,674 are over 60 years old, which represents 10.2% of the total population, according to consolidated data from the 2010 Census. The main justifications for this aging of the Uberlandic population are related to advances in medicine and public policies to improve the quality of life of this group of people. Compared to the 2000 Census, when Uberlândia had 37,614 elderly people, which represented 7.5% of the 501,214 inhabitants registered at the time, the growth in real numbers according to the last census is 24,060 elderly people. Furthermore, the municipality also has 58 registered inhabitants over the age of 100 (Silva, 2011).

The Ministry of Health's "Healthy Brazil" Program involves a national action to create public policies that promote healthier ways of living at all stages of life, favoring the practice of physical activities in daily life and leisure, access to healthy foods and reducing tobacco consumption. These issues are the basis for healthy aging, aging that also means a substantial gain in quality of life and health. The creation of groups of health promotion programs allows men and women to recover solidarity, the process of physical and psychological overcoming from an individual to a group level, and from this to a broader, social level. The actions of these groups are based on the new conception of state and public policies, since they are conceived as initiatives by the state and the organized population capable of making decisions autonomously. The techniques and content proposed for

health promotion programs must be guided by the needs identified in the singularities of each group and their objectives contained in health promotion. Health Promotion Groups are defined as a collective and interdisciplinary health intervention, consisting of a group process of its participants up to the ethical limit of eliminating unnecessary and avoidable differences between human groups. They are characterized as a set of people linked by constants of time, space and operating limits, who interact cooperatively in order to carry out the task of health promotion (Santos et al., 2006). Health programs must address the biopsychosocial dimensions related to the health-disease binomial and healthy aging (Ramos, 2003). In the present work, we intend to carry out an intervention in a group of elderly people in order to monitor cognitive progress for 12 weeks, with the aim of estimating and comparing the duration of beneficial effects in elderly people with or without cognitive impairment participating in an extension program in multisensory and cognitive stimulation workshops. In this work, automated, sensitive and specific cognitive assessment tests will be used systematically, with emphasis on tests that measure performance in executive functions, memory, attention and information processing speed, which are most affected by aging (Alexander et al., 2012) Therefore, in this study, we sought to verify whether a multicomponent cognitive stimulation program (PECM) is effective in improving the cognitive function of elderly people with or without impairment, applying the Montessori method. The strength and originality of this study was based mainly on the choice of already existing Montessori material: sensory and motor material. Our hypothesis was that by approaching the Montessori method, we could stimulate and increase the self-esteem and achievement of individuals with or without cognitive

impairment, because the activities correspond to the person's capabilities and interests and were observable through affection, behaviors and participation in activities.

Objectives To analyze the effectiveness of applying the Montessori method in elderly people to identify the effect of a multicomponent cognitive stimulation program (PECM) on improving the cognitive abilities of elderly people with or without prior impairment. The specific objectives of the study are the following: (1) verify the effects of PECM on improving cognitive functions among the elderly (in total and for specific subdomains); (2) determine differences in the effects of PECM on cognition (in total and for specific subdomains) between those under 80 years of age and in age groups over 80 years of age; (3) identify interactions between improvement in cognitive function through PECM and age.

METHODOLOGY

This is an intervention study that was developed at the ``Universidade Amiga da Pessoa Idosa``, an extension project at ``Universidade Federal de Uberlândia`` linked to the Dean of Extension and Culture at UFU. The present research was composed of a multidimensional assessment that covered various aspects of the lives of program participants, such as sociodemographic data, cognitive assessment, health status, functional status, to which the following questionnaires were applied: Sociodemographic and clinical information; • Health Status and Quality of Life Questionnaire SF-36 – Brazilian version • Anthropometry (through the Body Mass Index (BMI) and Waist-Hip Ratio (WHR)); • Assessment of functional capacity using the Barthel Index • Mini Nutritional Assessment – MNA • Mini Mental State Examination • 15-point Geriatric Depression Scale (EDG-15) • Palmar Grip • International Physical

Activity Questionnaire (IPAQ) • Falls Efficacy Scale – International (FES-I) • Time Up and Go (TUG)

The program was developed with a focus on activities aimed at preventing changes related to memory and language and organized in the form of brain academy workshops, where elderly people received a weekly booklet for cognitive training with 100 weekly exercises for 12 weeks lasting 50 minutes, the elderly also took the exercises to do at home, dedicating at least 10 minutes a day to carrying out the activity book. The themes in each session were addressed via intervention using the Montessori method using sensory material developed by Maria Montessori (Montessori, 1958). These are activities that involve classifying objects according to their texture, temperature, size, shape, color, etc. They also involve fitting shapes into their appropriate holes, map puzzles, anagrams, animals or plant parts. Participants were invited to make associations between different objects, to fit, stack, tie, button and manipulate different objects. These activities involve sensory, cognitive, executive and motor functions. Several participants were able to be present simultaneously, but each using their material individually.

TIME	INITIAL FREQUENCY	FINAL FREQUENCY
THE PERSON DIDN'T SCORE	7	3
4 min	3	22
5-9 min	20	17
10-19min	25	11
20 to 24 min.	4	6
28 to 33 min.	2	4
52 min	3	1

Table 1 - comparative table of the initial and final times of the 64 elderly participants in the brain academy



Figure 1 – Students participating in Brain Academy activities at home, and during actions at the University.

RESULTS AND DISCUSSION

The results were measured by the time spent performing the exercise at home and cognitive function was assessed by the Mini-Mental State Examination (MMSE) questionnaire. The results were evaluated at baseline and after the intervention. Logical reasoning time increased by 34% of elderly participants, with the MMSE score being significant for the study population. We found that the Brain Academy exercise sessions significantly increase cognitive reasoning and perception in the elderly.



Figure 2 – Image of the popsicle stick method for shape and color perception work.

FINAL CONSIDERATIONS

With this work, it is possible to suggest that brain gym exercises are a great strategy to help control and activate cognitive abilities, as well as being a preventive factor for slowing down

neurocognitive diseases when associated with techniques based on the principles of Montessori education. More detailed research must be carried out to better prove the technique.

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