

Original article

Cognitive Stimulation of Elderly Residents in Social Protection Centers in Cartagena, 2014

Estela Melguizo Herrera*, Anyel Bertel De La Hoz, Diego Paternina Osorio, Yurani Felfle Fuentes, Leidy Porto Osorio

Research Group Life and Care, Faculty of Nursing at the University of Cartagena, Cartagena, Colombia

ARTICLE INFO

Article history:

Received 1 July 2016

Accepted 29 September 2016

Available online 2 November 2016

Keywords:

Cognitive disorders

Elderly

Health

Memory

Orientation

ABSTRACT

Objective: To determine the effectiveness of a program of cognitive stimulation of the elderly residents in Social Protection Centers in Cartagena, 2014.

Methods: Quasi-experimental study with pre and post tests in control and experimental groups. A sample of 37 elderly residents in Social Protection Centers participated: 23 in the experimental group and 14 in the control group. A survey and a mental evaluation test (Pfeiffer) were applied. The experimental group participated in 10 sessions of cognitive stimulation.

Results: The paired t-test showed statistically significant differences in the Pfeiffer test, pre and post intervention, compared to the experimental group ($P=0.0005$). The unpaired t-test showed statistically significant differences in Pfeiffer test results to the experimental and control groups ($P=0.0450$). The analysis of the main components showed that more interrelated variables were: age, diseases, number of errors and test results; which were grouped around the disease variable, with a negative association.

Conclusions: The intervention demonstrated a statistically significant improvement in cognitive functionality of the elderly. Nursing can lead this type of intervention. It should be studied further to strengthen and clarify these results.

© 2016 Asociación Colombiana de Psiquiatría. Published by Elsevier España, S.L.U. All rights reserved.

Estimulación cognitiva de los adultos mayores residentes en centros de protección social. Cartagena, 2014

RESUMEN

Objetivo: Determinar la efectividad de un programa de estimulación cognitiva de los adultos mayores residentes en Centros de Protección Social de Cartagena en 2014.

Palabras clave:

Trastornos del conocimiento

* Corresponding author.

E-mail address: Emelguizoh@unicartagena.edu.co (E. Melguizo Herrera).

<http://dx.doi.org/10.1016/j.rcp.2016.09.008>

0034-7450/© 2016 Asociación Colombiana de Psiquiatría. Published by Elsevier España, S.L.U. All rights reserved.

Adulto mayor
Salud
Memoria
Orientación

Métodos: Estudio cuasi-experimental, con pre y post-test en grupos control y experimental. Participó una muestra de 37 adultos mayores residentes en Centros de Protección Social: 23 en el grupo experimental y 14 en el grupo control. Se aplicaron una encuesta y el test de valoración mental de Pfeiffer. El grupo experimental participó en 10 sesiones de estimulación cognitiva. Se tuvieron en cuenta las consideraciones éticas.

Resultados: La prueba de la t apareada mostró diferencias estadísticamente significativas en el test de Pfeiffer antes y después de la intervención en el grupo experimental ($p = 0,0005$). La prueba de la t no apareada mostró diferencias estadísticamente significativas en los resultados del test de Pfeiffer entre los grupos ($p = 0,0450$). El análisis de componentes principales mostró que las variables más relacionadas entre sí fueron: edad, enfermedades, número de errores cometidos y resultado de la prueba, las cuales se agruparon en torno a la variable enfermedad con una asociación negativa.

Conclusiones: La intervención demostró una mejoría estadísticamente significativa en la funcionalidad cognitiva de los adultos mayores. Enfermería puede liderar este tipo de intervenciones. Se debe continuar investigando para fortalecer y aclarar estos resultados.

© 2016 Asociación Colombiana de Psiquiatría. Publicado por Elsevier España, S.L.U. Todos los derechos reservados.

Introduction

Elderly population is in a steady climb, making organizations, both governmental and private, become interested in their welfare and improving their quality of life.¹ In Colombia, elderly is a person who is 60 years of age or older² and it is shown that 9.88% of the population is at this stage of the vital cycle.³

With age appears a series of events that, taken together, could hinder the psycho-social balance, hinder maintain harmony with oneself and the environment.⁴ That is, the capabilities of the person deteriorate.

One of these capabilities is the cognitive functionality, composed by all of the higher mental skills:⁵ Memory, the ability to retain and recall previously acquired ideas;⁵ abstract reasoning or calculation, the ability to write, read, understand numbers and perform arithmetic functions;⁵ orientation, it "refers to knowledge of personal identity and present circumstances", such as personal identification data, space and time; and general information, which includes data "of the salient events of the time."⁵

The importance of cognitive functionality is that it allows carrying out daily activities (talk, prepare a cup of coffee or handle money) and more complex tasks (reading, find the best solution to a problem or learn a musical instrument). That is, they allow the typically human features: being social and intelligent.⁴

Throughout life there might be a cognitive deficit and it is the family and the person itself who initially define whether or not the changes are pathological and seek for support.⁴ Generally, this is evident in some minor difficulties presented slow and progressively in time⁵ and has a negative impact on the quality of life, so it is appropriate to create a program that gives appropriate and favorable stimulation.⁴

Studies show that in Chile, only 59% of the elderly who participated in a study had an intact cognitive functionality⁶ and in Spain a 79.8%.⁷ In Cuba, two studies were found: one reported that 9.4% of the elderly participants in the

study showed decline in cognitive functionality⁸ and the other showed a decline of 13.8%.⁹ Also, studies in Mexico, found that 5.6% had some degree of deterioration¹⁰ and in Argentina 9.1% of the participants showed a mild impairment in cognitive functionality of amnesic type.¹¹

In Colombia there has been work on cognitive stimulation of elderly with conditions already apparent and not from the precautionary approach; most studies have moved forward with institutionalized people and using the mini-mental as one of the tools most commonly used in cognitive assessment. The results allow us to see that there has been improvement in terms of social and communicative relationships, depressive symptoms and interest in therapeutic intervention routines, apart from the cognitive processes.¹²⁻²⁰

It is also noted that group interventions were shown to be more beneficial than the individuals.¹⁵ This is consistent with the approach on the axes of therapeutic intervention proposed in gerontology: axe I, physico functional skills axis; axis II, cognitive skills; and axis III, creativity, social relationships and emotional well-being.²¹

Also, it is concluded that implementing permanent and ongoing in time programs and periodic monitoring of inputs and results in the higher cognitive abilities of patients plays an important role in order to be able to maintain these skills and slow the cognitive impairment.¹³

In Cartagena, Melguizo²² found that 47% of the residents in Social Protection Centers (SPC) of the city, in 2009, had some degree of cognitive impairment, showing association with age. It is noteworthy that of all the results of research found only three investigations were conducted with institutionalized elderly^{7,22,23} perhaps showing the need to work with this specific population.

The changes in cognitive functionality are presented in different ways and with different intensity among people.²² Cognitive functionality is associated with: visual functionality,^{24,25} diet,⁷ female gender, age over 65 years, low educational level, number of siblings and number of children.¹¹ Some studies showed that women have a higher frequency of deterioration than men.^{11,25}

Due to all the above, cognitive stimulation is required, which is no more than a technique that helps the elderly to peak in their intellectual performance thanks the implementation of many disciplines, in order to improve their quality of life.²⁶ Cognitive stimulation not only focuses on the mental side, it also addresses affective, behavioral, social, familial and biological issues; targeting the goal of a holistic intervention.¹ However, due to economic constraints and of time, only the mental part will be addressed in this study.

Cognitive functions might be strengthened through cognitive stimulation programs.^{23,27} Fernández²⁸ developed a biopsychosocial stimulation program for elderly, called "living with vitality", which aims to encourage people practicing lifestyles and forms of behavior that enable them to enjoy their welfare for as long as possible. This program was the main bibliographic reference for the development of this study because it was the only program of cognitive stimulation for the elderly that could be accessed; since no response from the other research groups working in this area was obtained.

In the SPC in the city of Cartagena, a lack of programs that favored comprehensive care and maintenance of the degree of independence, which in turn strengthen the elderly with cognitive impairment, stimulating intact cognitive processes, was evidenced.²² This invites to think that there is a need for adequate cognitive stimulation, with which these people could become more socially active and have a successful aging.

The most benefit and lucky with this study were the elderly who enjoyed being served, stimulated and accompanied in their rooms and had in each one of the processes performed the opportunity to recover to some extent part of their health. All this supports the public policy of aging and old age for the District of Cartagena, which shows the need to implement strategies for prevention, mitigation and improvement, and these include the creation of such programs.²⁹

Meanwhile, nursing as a profession is incorporated substantially in the achievements that were expected from this research, since nursing must respond to the health needs of the population, and should be provided within the framework of health policy. The results of this study provide not only to nursing but also to care professionals in general, a valuable and simple tool to provide an integral care to the elderly. This forms an open system, which Dorothea Orem presents as theory of nursing systems, in which the nurse acts to promote the independence of the person in their self-care as long as possible, or offsetting the unmet needs due to their physical and mental limitations, but without leaving aside educational support, and improving the quality of life not only of the individual but also of the family.³⁰

Given the above, the objective of this study was to determine the effectiveness of a program of cognitive stimulation of the elderly residents in Social Protection Centers in Cartagena, 2014.

Methods

Quantitative study, quasi-experimental design.³¹ The population was 192 elderly, Residents in four SPC in Cartagena. Two similar SPC were selected in terms of infrastructure, characteristics of personnel in charge of the elderly, number of elderly

people served, geographic location and the provision of guidelines for participation in the study. Then a SPC was randomly assigned to the control group and other one to the experimental group.

Inclusion criteria were being 60 or older, residing in a SPC, agreeing to participate in the study and attending to all the sessions of the intervention program. Those with mental disorders or conditions that would prevent them from providing the information required, and those who did not complete the intervention program sessions. Figure 1 illustrates the sample selection.

Information was collected by a previously trained nurse who was blinded about which group of elderly the intervention would be applied to; in order to control bias. A survey and a mental assessment test (Pfeiffer) were applied. The survey was designed by researchers and included aspects that, according to scientific literature, influence cognitive functionality of the elderly: age, sex, marital status, education, drugs they receive, pathologies, participation in physical activities and participation in productive activities.

The Mental assessment test (Pfeiffer): Used in our environment for its brevity and ease of implementation, has good validity in clinical diagnosis of dementia with good intra-observer reproducibility,³² values the mental state from 10 items, including four parameters: memory, orientation, information about daily events and ability to perform serial mathematical work. Presents a sensitivity of 68%, specificity of 96%, positive predictive value of 92%, negative predictive value of 82%, a test-retest reliability oscillating between .82 and .85 and a validity of .76 to .88 with the Mental Status Questionnaire.³³

Depending on the score it is obtained: 0 to 2 errors (no impairment), 3 to 4 errors (mild impairment), 5 to 7 errors (moderate impairment), 8 to 10 errors (severe impairment). On elderly who have not received primary education an error more was accepted and an error less in those who have completed higher education. The main problem is that Pfeiffer test does not detect small changes in evolution, which was not a problem for this investigation.

The intervention program used as a guide the program of Dr. Rocio Fernandez, which is titled "Living with vitality".²⁸ At the beginning of each the participants were requested to provide information about the current day, month and year, with brief information on where they were, to exercise the orientation component. An exercise of memory (visual, auditory or evocation) followed, these were held in all sessions with variations of the type of memory. This was complemented with the stimulation of the other two components, one per session, whether to develop the arithmetic component (with a problem type exercise with economic implementation); or the information component concerning daily events (read aloud clippings or recite the full name, age, place they were born and address of residence).

At the end, in all sessions they were assigned an independent work consisting in solving a daily problem of an economic nature or evoke current national, regional or local news published in the newspaper.

A week after completing the interventions, the Pfeiffer test to assess cognitive function in elderly (post-test) was applied again, which was in charge of the nurse that applied the

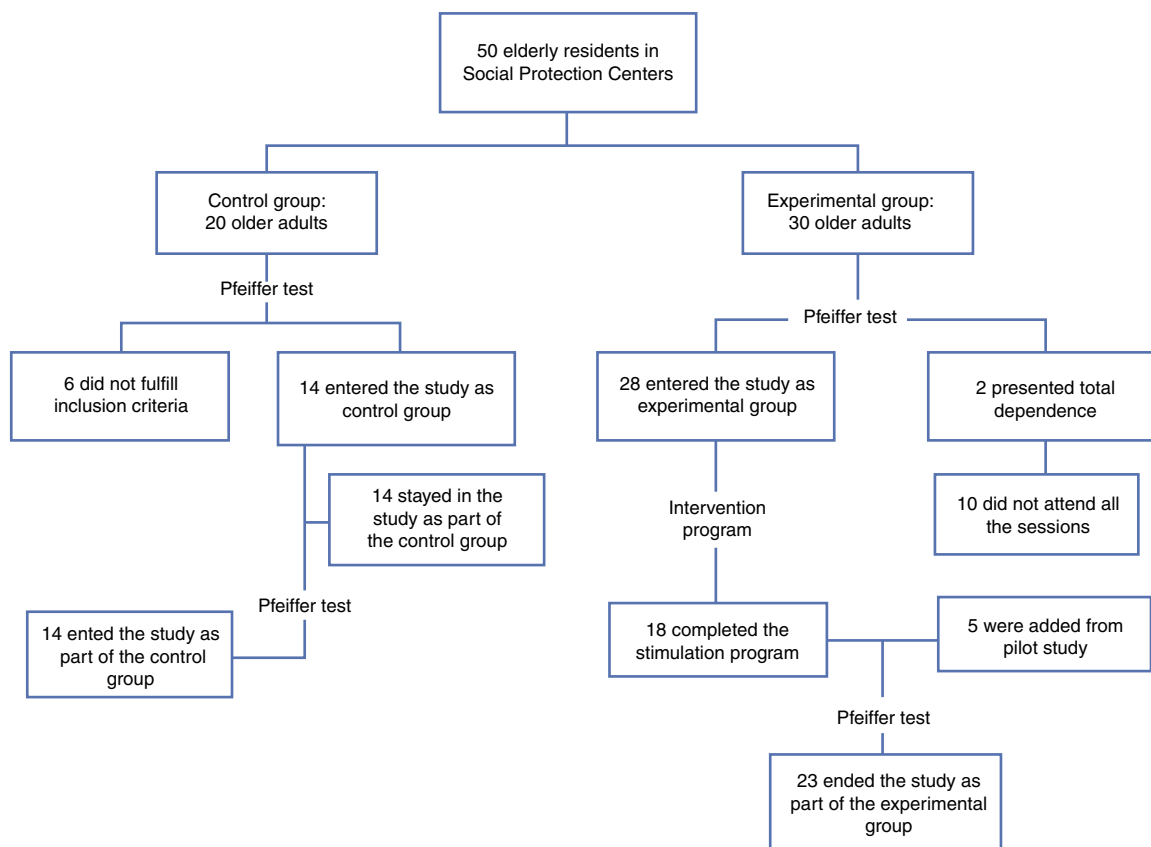


Figure 1 – Selection of the sample.

pre-test and who did not know which group was the control and which the experimental.

The stimulation program was implemented by the three researchers, nursing students from IX semester who had training in the program development and educational experience to carry it out and had the support of the researching teachers. The program included 10 sessions of 2 h each, 3 times a week. The time in each session was distributed as follows: 30 min for organization of participants and physical space, 15 min to say hello and explain the dynamics to develop. The next 60 min are focused on stimulating a specific dimension of cognitive function in accordance with the provisions of the stimulation program. And the final 15 min were used for a recreational activity.

During the month of January, the pilot was conducted in another SPC, with conditions similar to those of the centers selected for study. In this other center, only 5 people finally met the inclusion criteria. The pilot allowed to make the following adjustments: Using an acrylic board instead of a cart, adjusting the duration of each session to 2 h instead of 1,5 h and increasing the number of sessions per week to 3 (initially only 2 were planned) to have a better impact with the intervention. Data from the pilot study participants joined data in the experimental group, after verification of statistical relevance.

Measures of central tendency, dispersion and position statistics were estimated. Nonparametric tests, Wilcoxon rank test, paired and unpaired t-test were used; in order to find statistically significant differences evidencing the effect of the

stimulation program. The significance level assumed was .05. To validate the data matrix, Barlett spherical test and χ^2 test were used. Once validated the matrix, the main component analysis was applied, to see relationship that existed between the variables. For the statistical analysis the Prisma software, Minitab and SPSS version 20, were used.

The ethical issues referred to Resolution 08430 of October 4 of 1993 of the Ministry of Public Health, Colombia,³⁴ in the Declaration of Helsinki,³⁵ and the Code of Ethics of Nursing Colombia (Law 911 of 2004 of the Congress of Colombia)³⁶ evidenced in the protection of life, health, dignity, integrity, right to self-determination, privacy and confidentiality of information of the participants were considered; specified in the informed consent.

Results

A total of 37 elderly participated, 14 in the control group and 23 in the experimental group, with an average age in the control group of 76.5 years and for the experimental group of 74.3 years (Figures 2–6).

In the first phase of statistical analysis the relevance of linking the data from the pilot study with data from the experimental group was established, due to the low sample of the same. An analysis of whether the two groups means and variances did not differed significantly was conducted, in order to see if it was possible to merge the two groups and increase

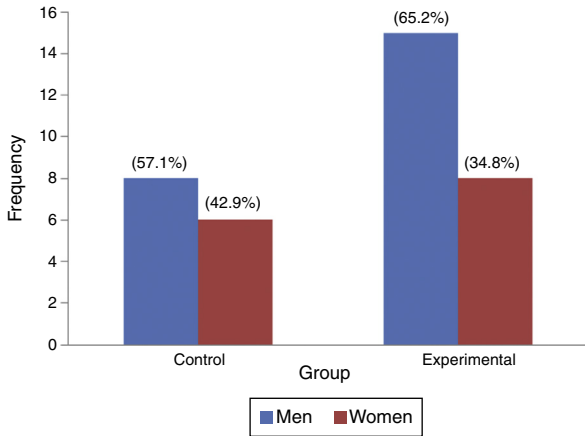


Figure 2 – Distribution by sex of the elderly in social protection centers. Cartagena, 2014.

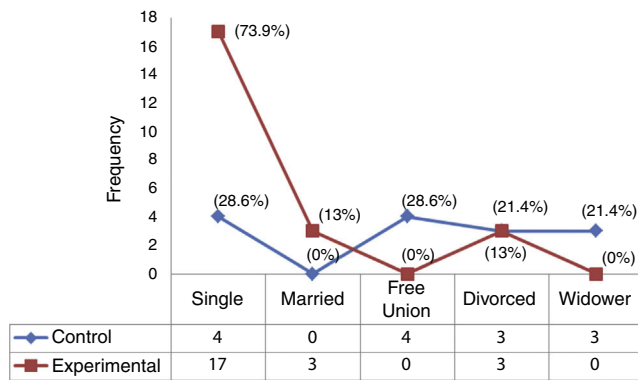


Figure 3 – Distribution by marital status of the elderly in social protection centers. Cartagena, 2014.

the size of the sample. The test applied to this case was the Wilcoxon test, which showed that there was no significant difference between the analyzed groups ($P > .05$) (Table 1).

The Wilcoxon test allowed to merge the pilot and experimental groups. Proceeding to establish whether there were differences in the experimental group before and after applying the intervention was the next step. The paired t-test showed statistically significant differences in the Pfeiffer test

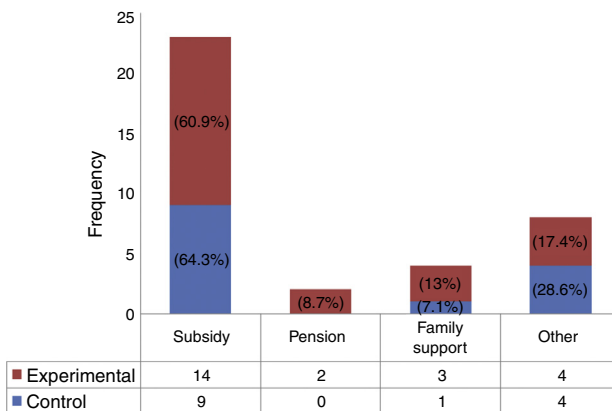


Figure 4 – Distribution by income of the elderly in social protection centers. Cartagena, 2014.

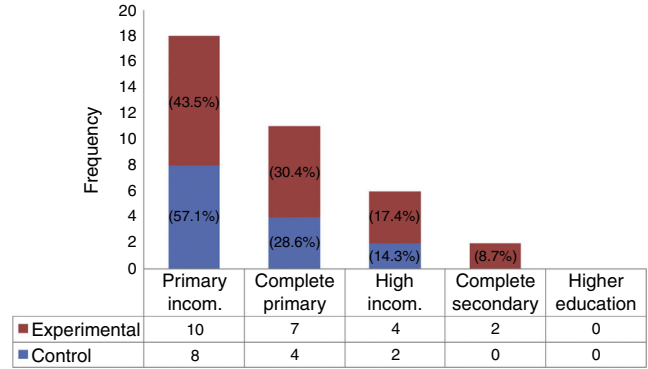


Figure 5 – Distribution according schooling of the elderly in social protection centers. Cartagena, 2014.

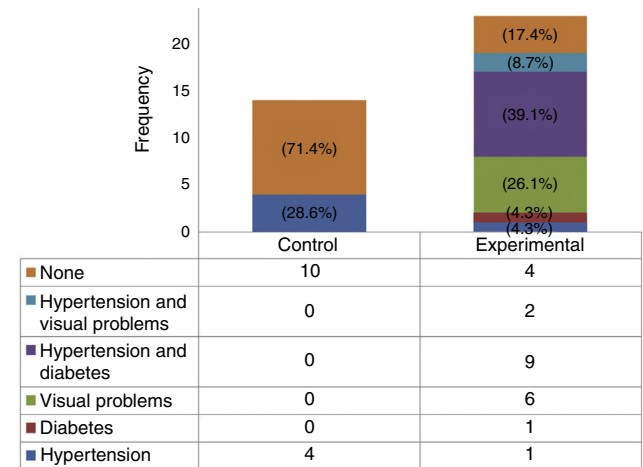


Figure 6 – Distribution by pathologies of the elderly in social protection centers. Cartagena, 2014.

results pre and post intervention in the experimental group ($P = .0005$) (Table 2).

Then, to determine whether there were differences between the experimental group and control group, an unpaired t test was applied; which showed statistically significant differences in the Pfeiffer test results in the experimental and control group (post intervention) ($P = .0450$) (Table 3).

Once the effectiveness of treatment is established, it was necessary to determine the relationship between the variables analyzed in the elderly. In order to do this a main component analysis in the experimental group was used, considering

Table 1 – Wilcoxon rank test applied to pilot and experimental groups.

P value	.5000
Exact or approximate P value?	Exact
P value summary	NS
Are medians significantly different? ($P < .05$)	No
One- or two-tailed P value?	Two-tailed
Sum of positive, negative ranks	.0000, 3000
Sum of signed ranks (W)	-3000

Source: surveys conducted.

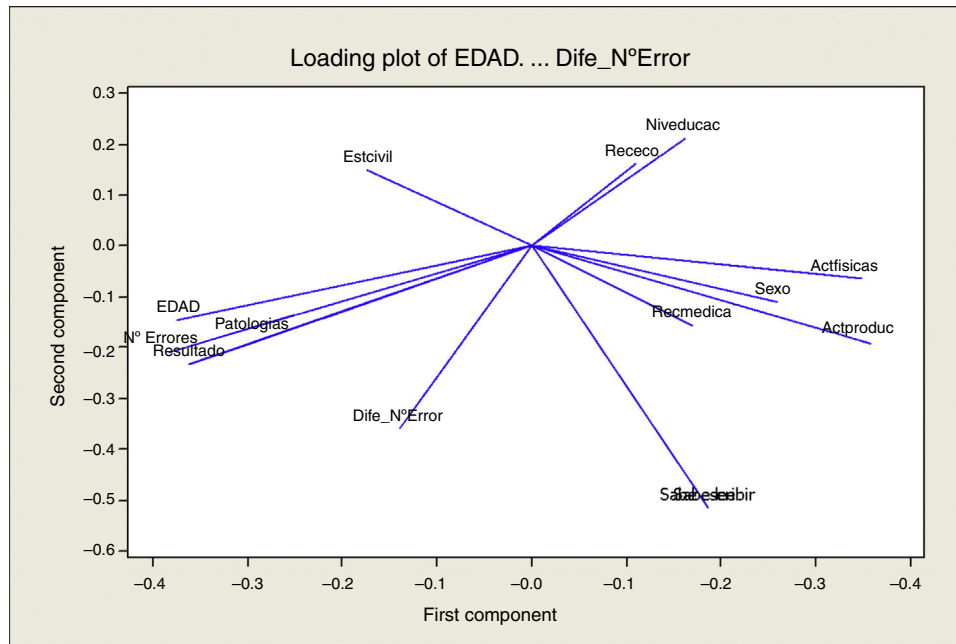


Figure 7 – Chart of main components of the experimental population.

the 16 components of the variables considered in this study (Figures 2–6). The relationship between variables was based on two main components: for the first component the age was considered and for the second component the variable disease was considered. Analysis showed that the more inter-related variables were: age, diseases, number of errors and test results; which were grouped around the second component, with a negative association (Figure 7).

Discussion

The non-parametric tests showed a statistically significant improvement ($P < .05$) in the cognitive functioning of elderly after participating in the stimulation program.

Table 2 – Results of the paired t-test on the experimental group before and after treatment.

P value	.0005
P value summary	
Means are significantly different? ($P < .05$)	Yes
One- or two-tailed P value?	Two-tailed
t; df	4,092; 22
Number of pairs	23
How big is the difference?	
Mean of differences	-0.5652
95% confidence interval	-0.8517 to -0.2788
R ²	.4322
How effective was the pairing?	
Correlation coefficient (r)	.8064
P value (one-tailed)	<.0001
P value summary	
Significantly the pairing was effective?	Yes

Source: surveys conducted.

Table 3 – Results of the unpaired t-test of the experimental and control group.

P value	.0450
P value summary	
Means are significantly different? ($P < .05$)	Yes
One- or two-tailed P value?	One-tailed
t; df	1.743; 35
How big is the difference?	
Mean ± SEM of column A	0.1324 ± 1.304 (n = 23)
Mean ± SEM of column B	0.2809 ± 1.786 (n = 14)
Difference between means	-0.4814 ± 0.2761
95% confidence interval	1042 to 0.07962
R ²	.07988
F test to compare variances	
F; RFn; Dfd	2739; 13; 22
P value	.0361
P value summary	
Significantly variances are different?	Yes

Source: surveys conducted.

In this study the average age was 75 years old between the two groups (74.3 the experimental group and 76.5 the control group), similar to the findings of Calero,²⁷ Garamendi,²³ and Rey,³⁷ who reported averages of 76.8, 71.9, and 73.3 years respectively. These results differ from the findings of Lopez,²⁵ who found an overall average of 83.4 years. It was found noteworthy in this study that older adults with advanced age are the lowest percentage, which might suggest that it is not necessary to be very old to be a resident in a SPC, but that it depends on the limitations of self-care or the caregiver difficulties.

As for sex, it was found that male gender predominated in both study groups. These data reveal an uncommon phenomenon, since at a national and local level the percentage of older male adults is lower than the percentage of female

adults.³ These results, though, might lead to assume that men are more likely to be institutionalized due to their need to be taken care by the spouse and, when missing this not having someone to provide care.²⁹

These data differ from the findings of Garamendi,²³ and Rey,³⁷ who showed a higher percentage of women in their respective studies. It seems that the gender distribution among SPC is variable. It would be appropriate to address this issue from a research approach.

As for the marital status of the participants, seniors alone (widowed, single and divorced) predominated in the two research groups. Apparently the conditions of deficit of self-care represent a deterioration of family functionality. Mainly the change in the marital status is given by death of spouse and is almost always the man who dies, that this gender seems to be the most affected by the change on its familiar functionality.

By educational level, there was a predominance of low education in the 2 study groups, which resemble those reported by Calero,²⁷ who found that 64.4% of the elderly in the study had received some academic formation. This could be a challenge for higher education institutions in the city of Cartagena (and Colombia), to offer programs for this population, which meet their interests and particular conditions.

There are no research results with which to compare our research findings regarding financial aid. This study found a predominance of elderly subsidized by the state, elderly pensioners are few. These data might be related to these being entities attached to the state.

Pathology with a higher presence in the control groups was high blood pressure (hypertension) with 4 people, and the remaining 10 were free of diseases. In the experimental group predominated older adults suffering from hypertension and diabetes. All this concurs with the pathologies of the life cycle in which the study participants are located.^{38,39}

Regarding to the effectiveness of the cognitive stimulation program for the elderly residents in SPC, it resembles the results of Garamendi,²³ who applied the program to a single group pre and post, resulting in a significant improvement with the Wilcoxon signed rank test.

The main difference with the other studies found are the variations in the intervention program (number of sessions, activities applied), but there is similarity between Garamendi,²³ Lopez,²⁵ Calero,²⁷ and Rey³⁷ programs, related to the time intensity of each session. Still, a more rigorous and with larger populations study is needed so that the results have greater significance.

In this study significant differences between Pfeiffer test results for the experimental and control group ($P=.045$) were found, as well as in the analysis of variance ($P=.03$). Similarly, Calero,²⁷ in his study in Spain, highlighted the change in the level of inter-group significance before and after the intervention. Likewise, Rey³⁷ advanced a study with 3 groups of elderly residents in SPC (without impairment, with mobility problems, and with impairment), in which seems to demonstrate that his program of stimulation, "Memory in Motion", had a positive effect on the group without deterioration, statistically significant; and in the group with impairment, a slight improvement that was not significant.

There was significant difference between the cognitive functionalities of the control and experimental groups, but these weren't greater than those of the experimental group before and after treatment, so it is necessary to conduct further studies with larger number of interventions and measure their impact.

The results suggest that age and the presence of pathologies influence the outcome of Pfeiffer test and the improving of cognitive ability; these are variables to consider in future studies in order to draw more accurate conclusions and improve the interventions. There were no reports found to discuss these results.

Within the limitations of this study is the small sample size and having only measured once the cognitive functionality of the experimental group after the intervention. Therefore, it is appropriate to continue investigating with a larger sample size, a greater number of post-intervention measurements and an increase in the number of sessions of the program.

Another limitation was that during the session the issue of the absence of the participants was evidenced, for reasons such as medical appointments, illness or preference for other leisure activities (Figure 1).

Conclusions

The cognitive stimulation program appears to be effective for improving the cognitive functionality of elderly living in SPC. Studies with larger populations, in which the results are measured repeatedly over time should be conducted; in order to strengthen and clarify the results of this research.

Nursing could be the professional of care in charge of the cognitive stimulation programs for elderly living in SPC, in order of these to be socially active, participating citizens, and have a better perception of their quality of life.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

Conflicts of interests

None.

REFERENCES

1. Jara M. La estimulación cognitiva en personas adultas mayores. *Rev Cúpula*. 2008;22:4-14.
2. Ley 1276 del 2009, a través de la cual se modifica la Ley 687 del 15 de agosto de 2001 y se establecen nuevos criterios de atención integral del adulto mayor en los centros vida. Bogotá: Congreso de Colombia; 2009.
3. Departamento Administrativo Nacional de Estadística. Estudios Postcensales no. 7 [cited 31 Ago 2012]. Available from: <https://www.dane.gov.co/index.php/estadisticas-por-tema/demografia-y-poblacion/proyecciones-de-poblacion.pdf>
4. Franco M, Criado C. Consideraciones teóricas en el estudio del Alzheimer. In: Franco M, Criado C, editors. *Intervención psicoterapéutica en afectados de enfermedad de Alzheimer con deterioro leve*. España: Instituto de Migraciones y Servicios Sociales; 2002. p. 9-27.
5. Cediell R. *Semiología médica*. 4.ª ed. Bogotá: Celsus; 2008.
6. Lara R, Mardones M. Perfil sociodemográfico de salud y funcionalidad en adultos mayores de la comunidad de Chillán. *Theoria*. 2009;18:81-9.
7. Aparicio A, Robles F, Rodríguez E, López A, Ortega R. Association between food and nutrient intakes and cognitive capacity in a group of institutionalized elderly people. *Eur J Nutr*. 2010;49:293-300.
8. Gómez N, Bonnin B, Gómez M, Yáñez B, González A. Caracterización clínica de pacientes con deterioro cognitivo. *Rev Cubana Med*. 2003;42:12-7.
9. González J, Gómez N, González J, Marín M. Deterioro cognitivo en la población mayor de 65 años de dos consultorios del Policlínico La Rampa. *Rev Cubana Med Gen Integr*. 2006;22:1-9.
10. González C, Ham R. Funcionalidad y salud: una tipología del envejecimiento en México. *Salud Pùb México*. 2007;49:S448-58.
11. Mías C, Sassi M, Masih M, Querejeta A, Krawchik R. Deterioro cognitivo leve: estudio de prevalencia y factores sociodemográficos en la ciudad de Córdoba, Argentina. *Rev Neurol*. 2007;44:733-8.
12. Valencia C, López E, Tirado V, Zea M, Lopera F, Rupprecht R, et al. Efectos cognitivos de un entrenamiento combinado de memoria y psicomotricidad en adultos mayores. *Rev Neurol*. 2008;46:465-71.
13. Basto D. Diseño e implementación de un proyecto de estimulación cognoscitivo, comunicativo para adultos mayores con deterioro cognitivo de la clínica atardecer de los años. Bogotá: Institución Universitaria Iberoamericana; 2012.
14. Cadavid A, Villada T, Klimenko O. Diseño, aplicación y evaluación de un programa de estimulación cognitiva para los adultos mayores institucionalizados en el hogar Santa Isabel del Municipio de Envigado. *Psicoespacios*. 2011;5:43-64.
15. Moreno C, Pineda D. Estimulación cognitiva en adultos mayores sanos y con deterioro cognitivo leve. Medellín: Universidad San Buenaventura; 2011.
16. Moreno C, Lopera F. Efectos de un entrenamiento cognitivo sobre el estado de ánimo. *Rev Chilena Neuropsicol*. 2010;5:146-52.
17. Vega F. Estimulación cognitiva en adultos mayores con envejecimiento normal residentes en Bogotá. Bogotá: Universidad San Buenaventura; 2012.
18. Velilla L, Soto E, Pineda D. Efectos de un programa de estimulación cognitiva en la memoria operativa de pacientes con deterioro cognitivo leve amnésico. *Rev Chilena Neuropsicol*. 2010;5:185-98.
19. Lara M. *Calidad de vida en el envejecimiento normal y patológico: una perspectiva terapéutica*. Bogotá: Universidad Nacional de Colombia; 2011.
20. Prada E, Pineda G, Mejía M, Conde C. Prueba computarizada Memonum: efecto de intervalos y distractores sobre la memoria de trabajo en mujeres mayores de 50 años. *Universitas Psychologica*. 2010;9:893-906.
21. Martínez T. *Centros de atención diurna para personas mayores: atención a las situaciones de fragilidad y dependencia*. Madrid: Médica Panamericana; 2010.
22. Melguizo E, Acosta A, Paternina D. Funcionalidad cognitiva de adultos mayores residentes en Centros de Protección Social de Cartagena 2013 [en prensa].
23. Garamendi F, Delgado D, Amaya M. Programa de entrenamiento cognitivo en adultos mayores. *Rev Mex Med Fis Rehabil*. 2010;22:26-31.
24. López J, Parraga I, Navarro B, Pretel F, Villena A, López M. Visual function versus visual acuity in older people. *Opht Epidemiol*. 2009;16:262-8.
25. López R, Colás M, Hernández E, Ruiz D, Padín C, Morell R. Envejecer: aspectos positivos, capacidad funcional, percepción de salud y síndromes geriátricos en una población mayor de 70 años. *Enf Clin*. 2006;16:27-34.
26. Alvares M. Atención a personas mayores desde la atención primaria. Barcelona: semFYC; 2004. p. 38-43.
27. Calero M, Navarro E. Eficacia de un programa de entrenamiento en memoria en el mantenimiento de ancianos con y sin deterioro cognitivo. *Clin Salud*. 2005;17:187-202.
28. Fernández R. *Colección Vivir con vitalidad*. Madrid: Pirámide; 2002.
29. Política pública de envejecimiento y vejez. Cartagena de Indias: Alcaldía de Cartagena de Indias; 2012-2014.
30. Acosta M. Explorando la teoría de Dorotea Orem. *Enf Neurol*. 2011;10:163-7.
31. Andrea N, Dumville J, Torgerson D. Investigación experimental. In: Gerrish K, Lacey A, editors. *Investigación en enfermería*. 5.ª ed. Madrid: McGraw-Hill; 2008. p. 239-59.
32. Pérez V. El deterioro cognitivo: una mirada previsor. *Rev Cubana Med Gen Integr*. 2005;21:1-8.
33. Asociación Española de Centros de reconocimiento de conductores. Cuestionario de estado mental portátil de Pfeiffer [cited 8 May 2013]. Available from: <http://centrospsicotecnicos.es/procesos-cognitivos-demencias/cuestionario-de-estado-mental-de-pfeiffer/gmx-niv54-con137.htm>
34. Resolución 08430 de 1993 por la cual se establecen normas científicas, técnicas y administrativas para la investigación en salud. Bogotá: Ministerio de Salud; 1993.
35. Asociación Médica Mundial. Declaración de Helsinki [cited 18 Abr 2011]. Available from: <http://www.wma.net/es/30publications/10policies/b3/17c.es.pdf>
36. Ley 911 de 2004, octubre 5, por el cual se dictan disposiciones en materia de responsabilidad deontológica para el ejercicio de la profesión de enfermería en Colombia; se establece el régimen disciplinario correspondiente y se dictan otras disposiciones. Bogotá: Congreso de Colombia; 2004.
37. Rey A, Canales I, Táboas M, Cancela J. Consecuencias cognitivas del programa Memoria en Movimiento en las personas mayores. *Eur J Human Mov*. 2009;22:113-31.
38. Guillen F, Ruiperez I. *Manual de Geriatria*. 3.a ed. Barcelona: 2003.
39. González J, Pichardo A, García L. *Geriatría*. México: McGraw-Hill; 2009.