

Effect of a cognitive-behavioral program on adherence to antihypertensive therapeutic regimen in older adults: a quasi-experimental study

ABSTRACT

Aims: To determine the effect of a cognitive-behavioral program on adherence to the antihypertensive therapeutic regimen of the elderly.

Study design: Quasi-experimental study.

Place and Duration of Study: It was performed in the House of the Grandfather, nursing homes Juan de Celayeta and Beautiful Sunset San Juan Bosco rest house, all of Tepic, Nayarit, between April 2015 and May 2016.

Methodology: We included 49 elderly people with arterial hypertension, in two groups: **interventional** and comparison, with written informed consent. Data collection was done with the questionnaire of therapeutic **adherence for** hypertension; blood pressure was measured with a portable aneroid sphygmomanometer. The cognitive behavioral intervention was performed on the **intervention** group based on psychoeducation and cognitive restructuring to improve adherence to the therapeutic regimen.

Results: Both groups were similar **in their** sociodemographic characteristics. For therapeutic adherence, there were statistically significant differences between the intervention group and the comparison group ($P < .05$). Membership to the intervention group showed a strong effect on non-hypertension, post intervention ($P < .05$).

Conclusion: The cognitive-behavioral program had a positive effect on adherence to the antihypertensive therapeutic regimen, showing significant changes in the intervention group, and a reduction in the proportion of patients with hypertension.

Keywords: Cognitive-behavioral program, adherence to therapeutic regimen, hypertension, older adults.

1. INTRODUCTION

The National Population Council (CONAPO) estimates that by 2050 the population pyramid will be inverted [1], that is, older adults will have a higher population rank compared to any other population group that has predominated in previous decades, which provokes the need for a change in the interventions of health services.

An older adult is a person who is 60 years of age or older [2]. Aging is a normal process of diminishing adaptation to the environment; it includes a series of biological, social, spiritual and psychological changes typical of each person. Some of the physical changes have decreased visual acuity, partial or total disability, paralysis, gait, sagging, loss of muscle mass and atrophy of muscle fibers, bones become more porous, etc. Psychologically, based on the theory of Peck and Erikson, the human goes through a crisis that needs to be resolved in order to grow healthy, there are feelings of frustration or depression, and in the social sphere, social skills diminish over time [3].

Aging is characterized by a deterioration of the body's ability to adapt to both its internal and the external environment particularly the detection of regulatory systems, which inevitably leads to death [4]. Such deterioration is not only influenced by biological processes, but this degeneration will depend on other factors, both environmental and social, but especially the degree of stimulation that is provided to each of them.

As we progress in age, and as a result of an unhealthy lifestyle, we can develop chronic degenerative diseases such as hypertension, defined as a multifactorial condition characterized by sustained increase in systolic blood pressure, diastolic or both, in the absence of renal or cardiovascular

diseases or diabetes, >140/90 mmHg; >130/80 mmHg if the patient have proteinuria greater than 1.0 g/dl, and >125/75 mmHg the patient has renal failure [5].

The prevalence of systemic arterial hypertension in Mexico is among the highest in the world [6], and it is an important risk factor for cardiovascular and renal diseases. Up to 90% of normotensive people at 55 years old will be hypertensive before their death [7]. Arterial hypertension has increased along with the process of demographic and epidemiological transition that Mexico is experiencing, forming part of the main causes of death in the country. The mortality rate observed in Mexico went from 17.67 deaths per 100,000 people in 2006 to 23.06 per 100,000 people in 2011. The only states that had a reduction of this rate from 2006 to 2011 are Baja California Sur and Morelos with differences of 3.14 and 1.19 points per 100,000 people, respectively; while in Oaxaca and Nayarit, it increased significantly in the same period (13.38 and 11.54 points each) [8].

The hypertensive patient has predictive factors of therapeutic non-adherence such as sex, work status, smoking, difficulties in the drug treatment, the patient's perception, changes in health habits, lack of awareness of the disease, among others [9]. The main reasons why a patient does not comply with treatment scheme indicated are sensory impairment (loss of vision and/or hearing, limited mobility, loss of ability to open containers, etc.), cognitive impairment and altered states of mind (dementia, depression, anxiety), most conditions are characteristic of older adults [10]. Adherence to the therapeutic regimen, as complex behavior, constitutes the basis of success in the treatment of diseases, making it a priority objective of an interdisciplinary intervention [11]. It is known that if a patient does not comply with the medical indications to control their disease, it will be difficult to predict the effect of the treatment, which may contribute to prolonging the treatment time and increase the risk of complications, and may even lead to death.

Adherence to the therapeutic regimen can be understood as the collaboration and proactive and voluntary participation of the patient with his treatment to obtain the best conditions for the control of the disease and with this, better health and life conditions, which go beyond of the passive compliance of the health professional's indications [12]. It includes not only administering medications to the patient but also, a balanced diet, not smoking, not abusing alcohol, exercising regularly, avoiding stress, attending medical appointments and follow-up [13].

Adherence has two key players: the patient and the multidisciplinary health team, their interaction will involve empathy, proper coordination and cooperation among them, availability, commitment and effective communication, which will facilitate the adequate control of disease and success in adherence to treatment. There are variables of the patient, the disease, the treatment and the patient-health relationship, as well as multiple factors related to adherence to the therapeutic regimen [14], which can be intervened in and responsibility shared among the healthcare team, the patient, and the family. It requires knowledge and changes in the lifestyle, which is proposed to modify through a nursing intervention with support, in this case, cognitive behavioral theory.

In a study of patients with heart failure and the average age of about 68 years, it was reported that cognitive impairment, mainly in memory affects adherence to treatment in patients without dementia [15]. Insel et al., studied adults older than 65 years without dementia and intervened to improve executive memory, trying to have the best adherence to treatment and it was found that the intervention improved adherence, but after five months it was lost; the intervention group increased adherence to treatment from 57% before the intervention to 78% after it [16].

Arana et al., found that the reasons for noncompliance manifested by the patients were: they did not know or forget the recommendations (55.9%), they were depleted of the medications provided by the program (38.2%), and side effects (2.9%) and 53.8% of the patients showed adequate blood pressure measures [17].

One of the main reasons for the presence of complications of hypertension in older adults is the lack of adherence to therapeutic measures, pharmacological and not pharmacological.

The main aim of the study was to determine the effect of a cognitive-behavioral program on adherence to the antihypertensive therapeutic regimen of the elderly.

2. METHODOLOGY

2.1 Study design

It was a quasi-experimental comparative, longitudinal, and prospective study, with naturally-formed groups.

2.2 Scope

Older adults registered in the House of the Grandfather and Nursing Homes Juan de Celayeta and Bello Atardecer, and in the House of Rest San Juan Bosco, in Tepic, Nayarit Mexico.

2.3 Sampling and sample size

The older adults registered in the institutions were invited to participate, and we randomized what institutions were from intervention and control groups. The interventional group was formed by older adults from the House of Grandfather and the Nursing Home Juan de Celayeta; the control group was established with older adults from the Nursing Home Bello Atardecer and the House of Rest San Juan Bosco.

Assuming that in the experimental group there is 50% adherence and in the comparison group 20%, including the total number of 49 older adults (100%) [24], the minimum sample size was 24 for the experimental group and 25 for the control group, with 95% accuracy and 80% power for both groups (EpiInfo 7.0, 2013, CDC, Atlanta, GA, USA).

2.4 Selection of patients

2.4.1 Inclusion criteria

Older adults with arterial hypertension, aged 65 years or older, male or female, without severe medical conditions, who agreed to participate in the research by signing informed consent.

2.4.2 Exclusion criteria

Older adults who did not accept to participate in the study and/or cognitive/motor condition.

2.5 Description of intervention

Cognitive-behavioral therapy (CBT) is a way of understanding how one thinks about oneself, other people, and the world around them, and how one's actions affect one's thoughts and feelings. CBT can help to change how you think (cognitive) and how you act (behavioral), and these changes can help you feel better. Unlike some of the other "spoken therapies," it focuses on problems and difficulties of the "here and now" [18].

Patient-centered interventions have been key in strategies to improve adherence to the therapeutic regimen since they promote disease education and treatment. These activities state that the adoption of a certain behavior involves an analysis of the evaluation of the benefit of carrying out a particular behavior and the response to this analysis will determine the maintenance or modification of the negative behavior by a positive one. It is an essentially educational model, where the therapist provides advice, corrects erroneous thinking styles, offers specific exercises (practices), provides up-to-date information, demonstrates interest, support, and encouragement. The greatest responsibility lies with the patient, who must practice the techniques. Intervention objectives include controlling anxiety disorder, post-traumatic stress disorder, acute stress disorder, generalized anxiety disorder, and mood disorders [19].

Cognitive therapy is a process of improvement in the quality of life of people to whom they apply processes of stimulation of cognitive functions: attention, memory, comprehension, temporal and spatial orientation [20]. Cognitive therapy includes those techniques that focus directly and primarily,

but not exclusively, on the cognitions (verbal and/or images) of clients to modify the emotions and behavior that they are supposed to regulate. Cognitive restructuring (CR), the technique underlying the intervention of this study, is that the patient, with the initial help of the therapist, identifies and questions his maladaptive thoughts, so that more appropriate ones replace them and are reduced or eliminated. In CR, thoughts are considered as hypotheses, the therapist and patient work together to collect data that determine whether these hypotheses are correct or useful [21].

CR is based on three basic assumptions [22]:

1. The reaction to an event depends mainly on how we perceive, attend, value, and interpret it and the expectations we have of it.
2. Thoughts can be identified through self-reports.
3. It is possible to modify thoughts to achieve behavioral changes.

Psychoeducation focuses on the belief that an informed patient has a better chance of successfully adhering long-term to the regimen or have better control of the disease, and can also achieve this even in the absence of health professionals. It involves the identification and understanding of the causes, symptoms, consequences and treatment of SAH and its relation to health risks. [12]

The intervention program was carried out based on the understanding of hypertension, improvement of dietary hygiene habits (food, exercise, etc.), perception of control over the disease, control behavior and adherence to pharmacological treatment. While cognitive restructuring identifies negative thoughts, erroneous beliefs of the disease that prevent them from performing actions for the benefit of adherence, by strengthening strategies for cognitive control that influence behavior to improve compliance with the therapeutic regimen of the older adult.

The program was given a total of 3 sessions once a week for a duration of 45 minutes per session, with a total of 3 weeks. After completion of the intervention program and reinforcement, the second measurement of adherence to the therapeutic regimen was performed, and blood pressure measurement was taken. Subsequently, the third measurement of adherence and vital signs was carried out at week 5.

2.5 Variables

2.5.1 Sociodemographic

We measured age (years), gender (male or female), education (none, elementary, secondary and high school), social security, civil status (single, married, widowed, divorced, separated, free union), religion (Catholic, Christian, others), and time since diagnosis of hypertension (years), according to information provided by the subject participating in the study.

2.5.2 Outcomes

Adherence to treatment is a dichotomous variable; it is the adherence to the treatment measure with the Therapeutic Adherence Questionnaire [23]; adherence was classified with 25-48 points, and non-adherence with 0-48 points; it was summarized as frequencies and percentages.

Arterial hypertension is a dichotomous variable; it is the arterial pressure $\geq 140/90$ mm Hg, a measure with a portable aneroid sphygmomanometer with a graduate scale of 0-300 mm Hg, a capacity to measure with a precision of ± 3 mm Hg, a reusable cuff with a non-conductive cloth lining and a velcro closure, an inflation knob with inflation valve for the inflation knob, own latex inflation bags for the different measures of bracelets, tube or hose with a length of 50 cm; hypertension was classified at 140/90 mm Hg or higher and non-hypertension at $<140/90$ mm Hg; it was summarized as frequencies and percentages.

2.6 Instruments

Data collection was conducted with the Therapeutic Adherence Questionnaire by Martin et al., [23] it is a scale that measures adherence to the therapeutic regimen, has 12 items and 5 response options ranging from "never", "almost never", "sometimes", "almost always" to "always". The Cronbach Alpha

internal consistency index obtained for the sample was .889. It has three factors called: active compliance, autonomy before treatment and complexity of adherence, which explained 68.72% of the cumulative variance. To calculate the score obtained by each older adult, 0 was assigned to the column never, 1 to almost never, 2 to sometimes, 3 to almost always and 4 to always, with a total of 48 possible points. With the total score obtained, they were classified into non-adherence 0–24 points and adherence 25–48 points.

2.7 Procedures

After informed consent was signed, the adherence questionnaire was applied to the elderly, and blood pressure was measured; the intervention program was implemented over three weeks, and subsequently, adherence to treatment and blood pressure were measured; both measurements were repeated at week 5.

2.8 Statistical analysis

Descriptive statistics were used for sociodemographic variables; measures of central tendency and dispersion, mean and standard deviation for quantitative variables and frequencies and percentages, for qualitative variables.

To demonstrate that both groups are similar, a Chi-squared or Z test was calculated for two independent proportions and *P-values*, for qualitative variables and Student's t-test for two independent means and *P-values* for quantitative variables.

For the hypothesis test, Z test was used for two proportions and *P-values*.

To search relationships among intervention and adherence to the therapeutic regimen, it was to calculate the Chi-squared test and *P-value*; to measure the effect of the educational program on adherence, the Risk Ratio (RR) was calculated and 95% confidence intervals.

To demonstrate statistical significance, the *P-value* was fixed in .05.

The statistical analysis was performed in STATA 13.0® (Stata Corp., College Station, TX, USA).

3. RESULTS AND DISCUSSION

The groups were composed of 24 older adults in the intervention group and 25 in the control group.

For the sociodemographic categorical variables, females, with elementary school, widows, identified as Catholic and those that were affiliated with the Mexican Institute of Social Security, predominated in both groups. There are no statistically significant differences between the two groups for categorical sociodemographic variables. Therefore, the groups are comparable (Table 1).

Table 1. Distribution of sociodemographic categorical variables by the group, from older adults with hypertension, Tepic, 2015.

Sociodemographic variables	Intervention group		Comparison group		X2 (df)	P-value
	n	%	n	%		
Gender					1.16 (1)	.28
Male	7	29.17	11	44.00		
Female	17	70.83	14	66.00		
Occupation					1.34 (2)	.51
Merchandiser	7	29.17	11	44.00		
Housekeeper	11	45.83	8	32.00		
Employee	6	25.00	6	24.00		

School						
None	5	20.83	5	20.00	-0.07*	.94
Elementary	16	66.67	19	76.00	-0.72*	.47
Secondary	2	8.33	1	4.00	-0.63*	.53
High school	1	4.17	0	0.00	-1.03*	.30
Social security						
MISS	16	66.67	19	76.00	-0.02*	.98
ISSWS	2	8.33	1	4.00	-0.01*	.99
PI	4	16.67	4	16.00	-0.001*	.99
Private	1	4.17	1	4.00	-0.0004*	.99
Others	1	4.17	0	0.00	-0.0004*	.99
Civil status						
Single	2	8.33	2	8.00	-0.04*	.97
Married	5	20.83	8	32.00	-0.89*	.38
Widow	15	62.50	15	60.00	0.18*	.86
Divorced	1	4.17	0	0.00	1.03*	.30
Free union	1	4.17	0	0.00	1.03*	.30
Religion Catholic						
Christianism	22	91.06	25	100.00	-1.47*	.14
Other	1	4.17	0	0.00	1.03*	.30
	1	4.17	0	0.00	1.03*	.30

*Z for two independent proportions because Chi-squared test cannot be calculated because there is a cell with zero.

MISS Mexican Institute of Social Security, ISSSWE Institute of Services and Social Security for Worker's from the State, PI Popular Insurance

Source: Study forms

Table 2 shows the distribution by age and time of diagnosis of hypertension by groups, and it is found that there are no differences in the mean age or time of diagnosis between groups. The above shows that both groups are comparable and there are no differences between them for categorical and quantitative sociodemographic variables.

Table 2. Distribution by age and time since diagnosis, older adults with hypertension and control group, Tepic, 2015.

Variable	Range	Mean $\pm$ SD	t (df)	P-value
Age (years)			-.18 (47)	.86
Intervention group (n=24)	66 a 97	81.67 $\pm$ 8.02		
Comparison group (n=25)	66 a 94	81.28 $\pm$ 7.00		
Years since diagnosis			.46 (47)	.65
Intervention group (n=24)	4 a 49	14.92 $\pm$ 10.22		
Comparison group (n=25)	6 a 30	16.00 $\pm$ 5.82		

SD Standard deviation DF degree of freedom

Source: Study forms.

Table 3 shows the results of the measurements of adherence to the treatment by groups, for baseline, post-intervention and the third measurement, finding that in the comparison between groups in the initial measurement the value of $P = .5$, and in the post-intervention measurement there was a statistically significant difference ($P < .5$) and RR of 4.17 with 95% CI between 2.07 and 8.37, meaning that membership in the intervention group had more than 4 times the possibility of having adherence to treatment. In the third measurement the Chi-square test could not be calculated because there is a cell with 0, so Z was calculated for two proportions between having adherence to the treatment and group, obtaining a statistically significant difference ($P < .05$).

Table 3. Tabulation of adherence to treatment by groups, pre- and post-intervention, Tepic, 2015

	Adherence to treatment					
	Pre-intervention		Post-intervention		3 ^a measurement	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Intervention group (n=24)	14 (58.33)	10 (41.67)	24 (100.00)	0 (0.00)	21 (87.50)	3 (12.50)
Comparison group (n=25)	21 (84.00)	4 (16.00)	6 (24.00)	19 (76.00)	0 (0.00)	25 (100.0)
Chi-squared test (DF)	3.95 (1)		5.46 (1)		6.19*	
P-value	.05		.0001		.00001	

Z for two independent proportions because Chi-squared test cannot be calculated.

DF degree of freedom

Source: Study forms

The objective of the study was to determine the effect of a cognitive behavioral program on adherence to the antihypertensive therapeutic regimen in older adults, in which it was possible to show that in the experimental group there was a better adherence to the therapeutic regimen compared with the group that did not receive it (comparison group). These results coincide with studies that support this type of program for elderly patients with hypertension [11-13, 24].

With the results obtained we calculated the sample size and with 100% of therapeutic adherence in the intervention group and 24% of adherence in the comparison group, the sample size is 8 in each group with 95% confidence and 80% of power (EpiInfo 7, 2013, CDC Atlanta, GA, USA), with our samples of 24 in the intervention group and 25 in the comparison group, it is sufficient to test the hypothesis that there is an effect of the intervention on adherence to treatment among the elderly.

The cognitive-behavioral program showed its effectiveness in increasing adherence to the antihypertensive therapeutic regimen, where 100% of the participants showed adherence to their therapeutic regimen, whereas in the CG, only 24% adhered. The results are similar to other studies on cognitive-behavioral programs that have proven to be effective [13, 25-27]. All these programs are composed of several components and are aimed at the development of skills and attitudes focused not only on medication but also on behaviors where the patient participates proactively in their treatment as recommended by some articles [28, 29].

The program allows us to identify the various components of such adherence; the intervention is focused on making the individuals acquire practical skills that will enable them not only to fulfill medical appointments and medication schedules, but also the behaviors and attitudes that actively associate the patient with adherence [30-32].

Therefore, programs aimed at increasing levels of adherence to the treatment of hypertension must meet certain specific characteristics because it is a multifactorial disease, these programs must be equally shaped by multiple components since, as previously mentioned, failure in adherence to treatment does not respond to a single cause [33-35].

Arrivillaga et al., reported a hypertensive population involved with cognitive behavioral therapy [11] and Holguin et al., with a biopsychosocial intervention program [12] that managed to significantly decrease systolic blood pressure levels and controlled diastolic blood pressure, decreasing the level of perceived stress and significantly increasing adherence to treatment; the results showed a positive change towards therapeutic adherence in the study subjects, and cognitive restructuring, cognitive behavioral technique, was shown to have a greater impact for the increase in adherence to treatment [22].

Table 4 shows the tabulation of arterial hypertension by groups, finding that there are statistically significant differences between the intervention group and the comparison group in the second and third measurements ($P < .05$). The RR in the second measurement was 0.12 with 95% CI of .03 to .045, meaning that belonging to the intervention group avoided reduced arterial hypertension incidence by up to 88% and in the third measurement we could not calculate RR due to a cell in 0 and Z was calculated for two independent proportions ($P < .05$).

Table 4 Tabulation of arterial hypertension ($\geq 140/90$ mmHg) by groups, pre- and post-intervention, Tepic, 2015

		Arterial hypertension					
		Pre-intervention		Post-intervention		3 ^a measurement	
		No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)
Intervention group (n=24)		10 (41.7)	14 (58.3)	22 (91.7)	2 (8.3)	24 (100.0)	0 (0.0)
Control group (n=25)		5 (20.0)	20 (80.0)	7 (28.0)	18 (72.0)	14 (56.0)	11 (44.0)
Chi-squared test (DF)		2.70		20.5		3.69*	
P-value		.1		.0001		.0002	

*Z for two independent proportions because it cannot calculate Chi-squared test.

DF Degree of freedom

Source: Study forms

The results show that the intervention was effective in significantly reducing the proportion of hypertensive patients. Which allows reference to other studies where there was also a reduction of both blood pressure figures, but the decrease in SAD was more significant [13,15], which broadens the range of possibilities so that through the multidisciplinary health team, quality programs can be generated with the firm aim of reducing the number of deaths due to high blood pressure.

4. CONCLUSION

With the results of the study, it is possible to conclude that the cognitive-behavioral intervention implemented lowered blood pressure levels in the elderly with arterial hypertension, showing significant changes in the intervention group and promoting adherence to therapeutic recommendations.

Likewise, adherence to the antihypertensive therapeutic regimen significantly increases as the elderly have greater attachment to both their pharmacological and non-pharmacological treatment, integrating thoughts and ideas appropriate to a healthy lifestyle. Blood pressure level results within the appropriate ranges ratify the importance of a solid treatment aimed at achieving the objectives of antihypertensive therapy.

Adherence to the therapeutic regimen of older adults requires the support of the multidisciplinary health team and the patient's commitment to their biopsychosocial characteristics, and if these do not work in harmony, it is likely that older adults will repeatedly show unsatisfactory control. It requires strategies that promote hypertensive patients and their families of healthy lifestyles and awareness programs for their disease, where they work with very specific therapeutic goals.

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ETHICAL APPROVAL

The protocol was approved by Bioethics Committee of Division of Health Sciences and Engineering, Campus Celaya-Salvatierra, University of Guanajuato with registry **CBDCSI-91141126**.

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