PHYSICAL ACTIVITY AND QUALITY OF LIFE IN HYPERTENSIVE PATIENTS

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ABSTRACT

Introduction: Hypertension is the most common chronic disease. There is a relationship between physical activity and a decrease in blood pressure figures. Objective: to evaluate the efficacy of a physical activity intervention program in hypertensive subjects. Methods: A randomized clinical trial was conducted with a physical activity intervention program from February to November 2019, with a control group and an intervention group. Results: At the end of the intervention, the participants' group decreased the risk of cardiovascular events and systolic blood pressure (p = 0.059) and BMI (p = 0.062). Conclusions: The intervention program increased physical activity and reduced cardiovascular risk and systolic blood pressure.

Keywords: physical activity, hypertension, cardiovascular disease, intervention.

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RESUMEN

Introducción: La hipertensión es la enfermedad crónica más común Existe relación entre la actividad física y disminución de cifras de tensión arterial. Objetivo: evaluar la eficacia de un programa de intervención de actividad física en sujetos hipertensos. Método: Se realizó un ensayo clínico aleatorizado, con un programa de intervención de actividad física de febrero a noviembre de 2019, con un grupo control y uno de intervención. Resultados: Al final de la intervención el grupo de intervención disminuyó más el riesgo de eventos cardiovasculares y la presión arterial sistólica (p = 0,059) e IMC (p = 0,062). Conclusiones: El programa de intervención aumentó la actividad física, redujo el riesgo cardiovascular y la presión arterial sistólica.

Palabras claves: actividad física, hipertensión arterial, enfermedad cardiovascular, intervención.

INTRODUCTION

Hypertension is the most common chronic disease recognized as a major risk factor for other chronic diseases such as cardiovascular disease (CVD), type 2 diabetes mellitus (T2DM) and chronic kidney disease[1]. In addition, its complications seriously increase the financial burden on public health services.

Hypertension is far from being controlled worldwide, despite the prescription of many antihypertensive drugs. The percentage of subjects with uncontrolled hypertension (≥140/90 mmHg) is high, ranging from 31.9% to 36.8% in the adult population[2]. A study in Spain describes that while the percentage of subjects receiving two or more antihypertensive drugs has increased in recent decades, the prevalence of uncontrolled hypertension has not changed significantly. Because of this situation, in addition to pharmacological treatment, it seems important to implement strategies to promote

healthy habits that help to avoid the main risk factors for hypertension (i.e., sedentary lifestyle, stress, poor quality of life, unbalanced diet, smoking), and, at the same time, follow protocols that help to treat and control hypertension[2].

Promoting physical activity (PA) is one of the modifiable risk factors that has a beneficial effect on cardiovascular disease (CVD) risk. Several randomized clinical trials (RCTs) with PA intervention programs have reported a reduction in CVD risk in the adult population[3]. In a recent meta-analysis of 26 RCTs with PA intervention programs, a reduction in BP in hypertensive subjects (-8.3 mmHg, systolic blood pressure (SBP) and -5.2 mmHg diastolic blood pressure (DBP)) was reported, although none of the RTCs indicated the percentage of subjects with controlled hypertension in these studies[3].

Several studies have addressed its relationship with arterial hypertension in relation to health-related quality of life (HRQoL). According to a meta-analysis of 20 observational studies, hypertensive subjects have lower levels of HRQoL than non-hypertensive subjects[4]. This lower perception of HRQoL has been related to the frequent presence of comorbidities, to the side effects of antihypertensive drugs (headaches, dizziness, tinnitus, nausea, etc.) and, in particular, to the difficulty in being able to control BP through prescribed medication[4].

However, although several studies have been conducted on the effect of PA on HRQOL, the results have been contradictory, and there are still very few studies on hypertensive subjects. Only 2 RCTs, were found with Asian populations that have studied this relationship, and both found a positive effect of PA on HRQoL in hypertensive subjects[4,5]. Another RCT conducted with Asian hypertensive subjects reported that improving HRQoL (general health and perception of bodily pain) decreased SBP[6]. In addition, certain favorable features have been reported in PA program designs aimed at improving HRQOL, such as group interventions, counseling, supervision, and those that included sociocultural activities.

Given the importance of BP control, further studies would be necessary to confirm this effect by promoting PA and HRQoL. However, a PA program designed to include the most favorable methodological characteristics will improve CV health and HRQoL, and these improvements, in turn, will favor BP control. Therefore, they aimed to evaluate the efficacy of a PA intervention program (group, supervised, and with sociocultural activities) on CVD risk, HRQoL, and BP control in hypertensive subjects.

METHOD

A randomized clinical trial was conducted, with a PA intervention program of 9 months duration, from February to November 2019, composed of a walking group of 120 min/week, supervised and with sociocultural activities. Five Primary Care Centers (CAP), four urban and one rural, participated in the city of Ambato. This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

Subjects were selected with arterial hypertension (controlled or uncontrolled) diagnosed more than one year ago, with these inclusion criteria: adult, primary health care user, signed informed consent, and without exclusion criteria such as having suffered an ischemic heart disease event (< 6 months), severe acute or acute intercurrent disease requiring hospital admission or medical rest, a flare-up of osteoarthritis that would limit ambulation, pulmonary or cardiac disease with dyspnea on small or moderate exertion.

Health professionals (physicians and nurses) at the participating CAPs invited hypertensive subjects to participate in the study during the six months prior to the intervention. Volunteers who agreed to participate were directed to the nurse responsible for the study in each CAP to assess their eligibility criteria.

The PA intervention program consisted of supervised group walking sessions (396 metabolic equivalents of task (METs)/min/week for 120 min, in 2 sessions of 60 min), according to international recommendations on PA, and with monthly sociocultural activities. A nurse and a PA specialist accompanied the participants in all activities (supervisors), which were pre-established. The walks consisted of circuits of about five kilometers around the city. Group sizes ranged from 15 to 30 participants.

Information on age, gender, social class, smoking and comorbidities (such as DM2, hyperlipidemia, overweight, obesity, depression, anxiety and osteoporosis) was obtained from personal interviews.

PA levels were measured using the short version of the International Physical Activity Questionnaire (IPAQ-s)[7]. The intensity (walking, moderate or vigorous), frequency and duration of PA were recorded. The min/week of each PA intensity was calculated. The metabolic equivalent of the task (MET)/min/week was obtained by multiplying the mean energy expenditure per min/week for each intensity of physical activity (3.3 MET for walking, 4.0 MET for moderate intensity and 8.0 MET for vigorous intensity). The results for each category of physical activity (walking + moderate intensity + vigorous intensity) were summed to obtain the total physical activity in MET/min/week[8].

BP was measured with a manual sphygmomanometer with participants at rest for at least five minutes. Three recordings were taken, and the average of the second and third readings was used in the statistical analyses. BP was controlled when it met the criteria of SBP and DBP < 140/90 mmHg, respectively, and uncontrolled when either of these conditions was not met. The percentage of subjects with controlled BP and the percentage change during the intervention from controlled to uncontrolled and from uncontrolled to controlled (final baseline) were calculated. In addition, weight (kg), height (cm), and waist circumference (cm) were measured, and body mass index [BMI as kg/m^2] was calculated.

The database and statistical processing of the data were performed and analyzed in the SPSS 26 statistical program (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for the results collection, presentation and interpretation. The significance level was set at 0.05 to consider the result significant. So, summary measures were used for quantitative data such as arithmetic mean and standard deviation. The χ^2 test was used to compare categorical variables in different groups, and Student's *t*-test was used to compare continuous variables.

RESULTS

There were 237 participants (I.G. = 175; CG = 62). During the intervention, 23 IG and 7 CG subjects dropped out, so 207 participants completed the study (IG = 152; CG = 55).

There were no significant differences in sociodemographic characteristics, smoking, comorbidities, food consumption or PA at baseline. However, total PA increased significantly at the end of the intervention in the IG, whereas it decreased in the CG (Table 1). Participants who dropped out had the same characteristics as those who completed the study regarding age, sex, social class, and comorbidity ($p > 0.05$).

Table 1. During the physical activity intervention program in hypertensive subjects, sociodemographic characteristics, health status, and physical activity.

Variables	Base Control Group (n = 55)	Intervention Group (n= 152)	P	Final Control Group (n = 55)	Final Intervention Group (n= 152)	p
Age (years)	70,1 (9,3)	67,4 (6,6)	0.057			
Women (%)	72.7	76.3	0.589			
Chronic diseases						
T2DM (%)	23.6	25.7	0.857			
Excess weight (%)	34.5	41.4	0.423			
Obesity (%)	60.0	48.0	0.157			
Dyslipidemia (%)	60.0	56,6	0.751			
Depression (%)	10.9	15.1	0.505			
Anxiety (%)	25,5	12.5	0.320			

Osteoporosis (%)	6.0	8.2	0.060			
Intensity of physical activity						
Walking (METs/min/week)	1459.0 (1431.9)	1363.0 (1997.8)	0.556	1565.0 (1997.8)	1912.0 (1545.4)	0.670
Moderate (MET/min/week)	484,0 (1230,8)	481.0(1210.1)	0.619	279,0 (760,5)	930,0 (1633,6)	0.004
Vigorous (METs/min/week)	164,0 (169,6)	161,0 (820,4)	0.165	161,0 (160,3)	208,4 (868,2)	0.077
Total (MET/min/week)	2107.0 (2156.5)	1995.3 (2112.7)	0.742	2005.2 (1989.2)	3050.0 (2466.4)	0.002

Source: statistical analysis, values expressed as mean and standard deviation except where indicated, $p \leq 0.05$.

No significant differences in CVD risk were observed between groups at baseline. However, at the end of the intervention, the IG, compared to the CG, decreased CVD risk more than the CG and SBP and increased the percentage of subjects with controlled BP and a tendency to reduce weight (p = 0.059) and BMI (p = 0.062). In addition, positive changes were observed in IG in the domains of physical function (p = 0.045), general health (p = 0.034) and vitality (p = 0.031), compared to CG.

This PA intervention program reduced the CVD risk score by -1.19 (p = 0.024) and the SBP level by -8.68 mmHg (p = 0.001), independently of baseline values. In addition, a favorable effect of the intervention on HRQOL was observed in the summary physical component (5.00 points, *p* = 0.036), physical function (14.62 points, *p* = 0.001), physical role (13.59 points, *p* = 0.020), bodily pain (10.84 points, *p* = 0.016), general health (6.56 points, *p* = 0.011) and vitality (4.45 points, *p* = 0.050), independently of the baseline levels of each component or domain.

A positive effect on the percentage of subjects with controlled BP at the end of the intervention was observed for the change in CVD risk during the intervention (OR 0.609), and for changes in HRQOL in the physical component summary (OR: 1.041), in physical role (OR: 1.010), and in bodily pain (OR: 1.014), in logistic regression models. All these associations are independent of the PA intervention program and of having controlled baseline BP. These results highlight the powerful effect of the PA intervention program in all models (OR 5.395 to 5.785).

DISCUSSION

This 9-month PA intervention program, with a 120-min/week supervised walking group and sociocultural activities, was aimed at hypertensive primary care users. The program increased the level of PA and improved CV health (decreased CVD risk and SBP) and some components or domains of HRQoL in IG. Furthermore, these favorable changes produced during the intervention in CVD risk and HRQoL (physical components or domains summary physical component, physical role and bodily pain) increased the percentage of subjects with controlled BP. Our results, estimated in multivariate models and without modification of dietary habits, contribute to the limited knowledge of the effect of PA on the improvement of HRQOL in hypertensive subjects and provide evidence of its effect on BP control,

The results of this study are supported by solid evidence from an RCT, which used validated questionnaires and controlled for related factors (age, sex, lifestyles, and comorbidity) through multivariate statistical techniques[9]. Randomization was performed in a 3:1 ratio, higher for the IG, to favor the potential health benefits of PA for a larger number of participants. The PA intervention program included the PA recommendations proposed by international agencies and the methodological characteristics of previous PA intervention programs that

showed greater health benefits: walking groups, sociocultural activities, or supervision by health professionals and PA specialists. However, a limitation of the study is that the CG did not participate in any activity as an alternative to the intervention.

During the intervention, no dietary advice was given to participants, so they did not modify their dietary intake; therefore, the results could be interpreted independently of diet. This control is rarely included in the RCTs reviewed, despite the fact that diet is a factor strongly related to BP [10].

The results show that total PA significantly increased by 1054.7 (±2926.4) MET/min/week in the IG, between the beginning and the end of the intervention, while it decreased by 101.8 (±2320.7) MET/min/week in the CG In the IG, approximately 35% of the PA corresponded to walking in the intervention program and 65% to other activities outside the program. The data indicate the effectiveness of this program in promoting different leisure activities. Some authors have related these favorable results to some of the program's characteristics, such as supervision, group walking and sociocultural activities, which probably favored these improvements[11].

The PA intervention program showed a reduction in overall CVD risk and some components, mainly SBP levels (from 134.5 to 131.8 mmHg, $p = 0.002$) and the percentage of subjects with controlled BP. In addition, there was a non-significant trend in the decrease in body weight and BMI. In the multivariate models, the reduction in CVD risk was confirmed (-1.19 points, $p = 0.024$), and the decrease in SBP was even greater in the multivariate analysis (-8.68 mmHg, $p = 0.001$) compared to the bivariate analysis.

Other RCTs conducted in developed countries with hypertensive subjects showed results consistent with ours[12]. A recent meta-analysis of 26 RCTs with PA intervention programs of 45 to 180 min/week and 6 to 56 weeks duration observed a significant reduction in SPB (-8.3 mmHg) [3]. However, none of these studies assessed weight or BMI. There is strong evidence in the general population that physical activity is a determining factor in decreasing and maintaining a healthy weight, with more significant benefits observed when it is greater than 150 min/per week. An RCT involving a PA intervention program of 165-220 min/week with hypertensive subjects observed a significant reduction in body weight (-1.8 kg) and BMI (-0.6 kg/m2), better results than in the present study (- 1.1 kg and - 0.05 kg/m2, respectively) [13].

The increase in the percentage of subjects with controlled BP in the IG at the end of the intervention, from 40.8% to 49.3%, contrasts with a reduction from 43.6% to 36.4% in the CG (P = 0.015). The same trend is observed in the change from uncontrolled to controlled BP, as it is significantly higher in the IG (20.4%) than in the CG (12.3%) (p = 0.042). Unfortunately, there is a paucity of knowledge on the effect of PA on controlled BP. Therefore, most studies were reviewed to assess PA's effect on BP levels[14]. As an exception, one study observed an increase from 11.8% to 19.7% of hypertensives who could control BP due to an intervention program based on diet and exercise advice and adherence to antihypertensive treatment for six months[15].

RCTs that have evaluated the relationship between PA and HRQoL have found conflicting results and appear to be related to the characteristics of the PA program. For example, while studies based on PA advice or supervised aerobic PA programs reported a positive relationship, unsupervised studies with high levels of aerobic PA or high intensity reported no benefit on HRQoL[16,17].

The main objective in treating arterial hypertension is maintaining normal levels, although this remains difficult to achieve. With this in mind, the present study evaluated the effect of the changes (final - baseline) produced during the intervention on CVD risk and HRQoL on the percentage of subjects with controlled BP, through logistic regression models, adjusted for the intervention of the PA program, and baseline BP control, among other variables.

There was a decrease in the risk of CVD during the intervention. It should be taken into account that negative values in this variable are favorable since they reduce the risk of CVD, so OR values < 1 (0.609) would be enhancers of the effect of the dependent variable, that is, they enhance the probability of having controlled BP. For the interpretation of an OR < 1, it is better to calculate the inverse value (1/0.609 = 1.64) and interpret a 1-unit decrease in CVD risk during the intervention as a 1.64-fold increase in the probability of having controlled BP. The change or increase during the intervention in the

summary of the physical component, physical role and bodily pain of HRQoL had a direct positive effect on BP control (OR: 1.041; 1.010 and OR: 1.014 respectively). These odds ratios, although modest, are important[18,19].

Although the mechanisms involved in the described relationship between improved HRQoL and BP control are not clear, this could be because there is an association between HRQoL and stress and anxiety, and improved perception of HRQoL reduces stress and anxiety levels. These factors are related to increased sympathetic nervous activity, which causes high BP levels. In addition, improved HRQoL favors the acquisition of healthy behaviors, such as regular PA, healthy eating, self-care, and greater support for adherence to antihypertensive treatments[20, 21].

These positive relationships between program completion decreased CVD risk, and increased quality of life on BP control would support the benefit of promoting healthy lifestyles and quality of life as adjunctive actions to BP treatment.[22]

CONCLUSIONS

The 9-month supervised PA intervention program, with 120 min/week walking group and sociocultural activities, increased physical activity, reduced CVD risk and systolic BP, and increased HRQoL scores in the physical component summary and its domains and mental component vitality. Furthermore, the PA intervention program itself, together with the reduction in CVD risk during the intervention and the improvement in some areas of HRQoL, such as the physical component summary, and the role of physical pain scores, increased the percentage of hypertensives with controlled BP at the end of the study.

REFERENCES

1. Jordan J, Kurschat C, Reuter H. Arterial Hypertension. Dtsch Arztebl Int [Internet]. 20 de agosto de 2018 [citado 3 de junio de 2022];115(33-34):557-68. Disponible en: https://pubmed.ncbi.nlm.nih.gov/30189978/
2. Pereira M, Lunet N, Azevedo A, Barros H. Differences in prevalence, awareness, treatment and control of hypertension between developing and developed countries. J Hypertens [Internet]. mayo de 2009 [citado 5 de junio de 2022];27(5):963-75. Disponible en: https://pubmed.ncbi.nlm.nih.gov/19402221/
3. Cornelissen VA, Smart NA. Exercise training for blood pressure: a systematic review and meta-analysis. J Am Heart Assoc [Internet]. 1 de febrero de 2013 [citado 5 de junio de 2022];2(1): e004473. Disponible en: https://pubmed.ncbi.nlm.nih.gov/23525435/
4. Trevisol DJ, Moreira LB, Kerkhoff A, Fuchs SC, Fuchs FD. Health-related quality of life and hypertension: a systematic review and meta-analysis of observational studies. J Hypertens [Internet]. febrero de 2011 [citado 7 de junio de 2022];29(2):179-88. Disponible en: https://pubmed.ncbi.nlm.nih.gov/21045726/
5. Sun J, Buys N. Community-Based Mind-Body Meditative Tai Chi Program and Its Effects on Improvement of Blood Pressure, Weight, Renal Function, Serum Lipoprotein, and Quality of Life in Chinese Adults with Hypertension. Am J Cardiol [Internet]. 1 de octubre de 2015 [citado 9 de junio de 2022];116(7):1076-81. Disponible en: https://pubmed.ncbi.nlm.nih.gov/26251005/
6. Tsai AC, Morton SC, Mangione CM, Keeler EB. A meta-analysis of interventions to improve care for chronic illnesses. Am J Manag Care [Internet]. agosto de 2005 [citado 2 de mayo de 2022];11(8):478-88. Disponible en: https://pubmed.ncbi.nlm.nih.gov/16095434/
7. Hagströmer M, Oja P, Sjöström M. The International Physical Activity Questionnaire (IPAQ): a study of concurrent and construct validity. Public Health Nutr [Internet]. septiembre de 2006 [citado 6 de junio de 2022];9(6):755-62. Disponible en: https://pubmed.ncbi.nlm.nih.gov/16925881/
8. Jetté M, Sidney K, Blümchen G. Metabolic equivalents (METS) in exercise testing, exercise prescription, and evaluation of functional capacity. Clin Cardiol [Internet].

agosto de 1990 [citado 8 de junio de 2022];13(8):555-65. Disponible en: https://pubmed.ncbi.nlm.nih.gov/2204507/

9. He J, Irazola V, Mills KT, Poggio R, Beratarrechea A, Dolan J, et al. Effect of a Community Health Worker-Led Multicomponent Intervention on Blood Pressure Control in Low-Income Patients in argentina: A Randomized Clinical Trial. JAMA [Internet]. 19 de septiembre de 2017 [citado 9 de junio de 2022];318(11):1016-25. Disponible en: https://pubmed.ncbi.nlm.nih.gov/28975305/
10. Lundqvist S, Börjesson M, Cider Å, Hagberg L, Ottehall CB, Sjöström J, et al. Long-term physical activity on prescription intervention for patients with insufficient physical activity level-a randomized controlled trial. Trials [Internet]. 15 de septiembre de 2020 [citado 5 de junio de 2022];21(1):793. Disponible en: https://pubmed.ncbi.nlm.nih.gov/32933577/
11. Patnode CD, Evans CV, Senger CA, Redmond N, Lin JS. Behavioral Counseling to Promote a Healthful Diet and Physical Activity for Cardiovascular Disease Prevention in Adults Without Known Cardiovascular Disease Risk Factors: Updated Systematic Review for the US Preventive Services Task Force [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (US); 2017 [citado 5 de junio de 2022]. (US Preventive Services Task Force Evidence Syntheses, formerly Systematic Evidence Reviews). Disponible en: http://www.ncbi.nlm.nih.gov/books/NBK476368/
12. Arija V, Villalobos F, Pedret R, Vinuesa A, Timón M, Basora T, et al. effectiveness of a physical activity program on cardiovascular disease risk in adult primary health-care users: the «Pas-a-Pas» community intervention trial. BMC Public Health [Internet]. 15 de junio de 2017 [citado 4 de junio de 2022];17(1):576. Disponible en: https://pubmed.ncbi.nlm.nih.gov/28619115/
13. Kuhmmer R, Lazzaretti RK, Guterres CM, Raimundo FV, Leite LEA, Delabary TS, et al. effectiveness of multidisciplinary intervention on blood pressure control in primary health care: a randomized clinical trial. BMC Health Serv Res [Internet]. 31 de agosto de 2016 [citado 6 de junio de 2022]; 16:456. Disponible en: https://pubmed.ncbi.nlm.nih.gov/27581760/
14. Pescatello LS, Buchner DM, Jakicic JM, Powell KE, Kraus WE, Bloodgood B, et al. Physical Activity to Prevent and Treat Hypertension: A Systematic Review. Med Sci Sports Exerc [Internet]. junio de 2019 [citado 3 de junio de 2022];51(6):1314-23. Disponible en: https://pubmed.ncbi.nlm.nih.gov/31095088/
15. Blom EE, Aadland E, Skrove GK, Solbraa AK, Oldervoll LM. Health-related quality of life and physical activity level after a behavior change program at Norwegian healthy life centers: a 15-month follow-up. Qual Life Res [Internet]. noviembre de 2020 [citado 6 de junio de 2022];29(11):3031-41. Disponible en: https://pubmed.ncbi.nlm.nih.gov/32562195/
16. Blom EE, Aadland E, Skrove GK, Solbraa AK, Oldervoll LM. Health-related quality of life and intensity-specific physical activity in high-risk adults attending a behavior change service within primary care. PLoS One [Internet]. 2019 [citado 3 de junio de 2022];14(12): e0226613. Disponible en: https://pubmed.ncbi.nlm.nih.gov/31860678/
17. Awotidebe TO, Adeyeye VO, Ogunyemi SA, Bisiriyu LA, Adedoyin RA, Balogun MO, et al. Joint predictability of physical activity and body weight status on health-related quality of life of patients with hypertension. J Exerc Rehabil [Internet]. octubre de 2017 [citado 26 de mayo de 2022];13(5):588-98. Disponible en: https://pubmed.ncbi.nlm.nih.gov/29114535/
18. Kettle VE, Madigan CD, Coombe A, Graham H, Thomas JJC, Chalkley AE, et al. effectiveness of physical activity interventions delivered or prompted by health professionals in primary care settings: systematic review and meta-analysis of randomised controlled trials. BMJ [Internet]. 23 de febrero de 2022 [citado 6 de

junio de 2022];376: e068465. Disponible en: https://pubmed.ncbi.nlm.nih.gov/35197242/

19. Sakboonyarat B, Mungthin M, Hatthachote P, Srichan Y, Rangsin R. Model development to improve primary care services using an innovative network of homecare providers (WinCare) to promote blood pressure control among elderly patients with noncommunicable diseases in Thailand: a prospective cohort study. BMC Prim Care [Internet]. 6 de marzo de 2022 [citado 7 de junio de 2022];23(1):40. Disponible en: https://pubmed.ncbi.nlm.nih.gov/35249550/
20. Baker PRA, Francis DP, Soares J, Weightman AL, Foster C. Community wide interventions for increasing physical activity. Cochrane Database Syst Rev [Internet]. 5 de enero de 2015 [citado 5 de junio de 2022];1:CD008366. Disponible en: https://pubmed.ncbi.nlm.nih.gov/25556970/
21. Zurita MAL, Camaraza CA. Metodología para la evaluación de la calidad de las maestrías en la Universidad Regional Autónoma de Los Andes. Universidad y Sociedad [Internet]. 2022 [citado el 6 de octubre de 2022];14(S2):96–105. Disponible en: https://rus.ucf.edu.cu/index.php/rus/article/view/2765
22. Arvelo PMM, Mora JFM, González REA. Influencia del derecho canónico en los sistemas jurídicos latinoamericanos: análisis desde el pluralismo jurídico. Universidad y Sociedad [Internet]. 2022 [citado el 6 de octubre de 2022];14(S2):106–11. Disponible en: https://rus.ucf.edu.cu/index.php/rus/article/view/2766