International Journal of Public Health (2020) 65:55–64
https://doi.org/10.1007/s00038-019-01317-x

REVIEW

Interventions to increase the pharmacological adherence on arterial hypertension in Latin America: a systematic review

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Received: 7 July 2019 / Revised: 26 November 2019 / Accepted: 28 November 2019 / Published online: 9 December 2019

Abstract

Objectives This review aims to summarize evidence on the effectiveness of interventions to improve antihypertensive drug adherence in Latin America and the Caribbean.

Methods A systematic search from January 2000 to October 2018 was conducted through LILACS, SciELO, MEDLINE, Health Evidence, Cochrane Library and Embase. Search terms were in English, Portuguese and Spanish through the MeSH and DECS.

Results Seven articles were included in the study. The main discoveries indicate that implemented interventions to increase the adherence are very varied. Likewise, a high variability in levels of adherence was found (46–94%) and we could evidence that indirect measurements were used. Lastly, it was evidenced that the obstacles for adherence were mainly associated with the adverse effects of antihypertensive medication, the dosage and forgetfulness of the medication intake given the age of the patients.

Conclusions There is no single strategy to increase pharmacological adherence in Latin America since the studies used different strategies. Additional efforts are required to standardize cost-effective interventions to increase pharmacological adherence in Latin America.

Keywords Medication adherence · Compliance · Intervention · Hypertension · Latin America

Introduction

High blood pressure (HBP) is a serious public health problem (World Health Organization 2011). It is estimated that nearly 32% of worldwide population suffer from HBP and approximately 9.4 million people die each year from this condition (World Health Organization 2011; Kandala and Uthman 2015). Furthermore, HBP is the third highest cause of disability in the world (World Health Organization 2011; Alghurair et al. 2012). The prevalence of this condition and the mortality caused by it are seen more frequently in middle- and low-income countries (World Health Organization 2013). In the case of Latin America, the prevalence among general population is close to 40%, eight percentage points higher than the rest of the world (Kandala and Uthman 2015). Many efforts have been made to control HBP. One of these has been the design of new efficient and low-cost antihypertensive medicines (Gasperin et al. 2009). The objective was to reduce the risk of having cerebrovascular accidents, myocardial infarctions, kidney damage and heart failure (Fung et al. 2007; World Health Organization 2004). Pharmacological interventions are effective to control HBP, especially when they are accompanied by nonpharmacological interventions (Appel et al. 2003; Lisspers et al. 2005; Lobo et al. 2004).

Factors related to pharmacological adherence

Although antihypertensive medicine is effective (Chow et al. 2013; Krueger et al. 2018), control prevalence of arterial pressure is close to 30% worldwide (Ikeda et al. 2014). One of the main control factors is pharmacological

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adherence (Zeller et al. 2008), which, in high-income countries, is estimated at 45% approximately, and in low- and middle-income countries, it is potentially lower (Abegaz et al. 2017). One of the main reasons for the lack of adherence is the individual's socioeconomic level, which limits access to health services, and as a consequence, is directly associated with a low control on HBP and reduced health outcomes (García-Reza et al. 2012; Grotto et al. 2008).

In addition to socioeconomic level, there are different modeling factors to pharmacological adherence such as the availability of medication, patient's own biological factors, information about illness and cultural behavior. In the case of low- and middle-income countries, such as Latin American countries, five out of six patients expressed some sort of difficulty related to price, access to health services (van Mourik et al. 2010) and administrative or geographic barriers (Herrera 2012) to acquire antihypertensive medicine. Other factors associated negatively with pharmacological adherence are the adverse side effects of the medicine (Barreto et al. 2014), HBP asymptomatic condition and forgetfulness of taking medications as a result of chronic stress (Marshall et al. 2012). In regard to cultural behavior, it has been reported that the use of homemade remedies in Latin America is considered as an alternative for treatment for HBP, which can compete with conventional treatment (Barreto et al. 2014; Rodríguez-Abt et al. 2017).

Regardless of the way pharmacological adherence is measured, there is a consensus about the fact that the levels of adherence are low and constitute a public health problem, especially in low- and middle-income countries; for which solutions must be identified (Abegaz et al. 2017; Varela 2010).

Interventions to the adherence in Latin America

A considerable amount of interventions has focused on the results of HBP control, leaving aside the strategies created to increase adherence (Kleinsinger 2018). Some authors have analyzed this term in reference to existing measurement methods (López-Romero et al. 2016; Nogués et al. 2007), while others have opted for defining adherence through a specific type of interventions focused on taking medication (Dhar et al. 2017) or modifying behaviors (Crowley et al. 2013).

There have been several systematic studies collating evidence with regard to interventions that have increased pharmacological adherence in patients with HBP (Alghurair et al. 2012; Gellad et al. 2012). However, in the case of Latin America and the Caribbean, there have been no known systematic reviews that have shown implemented interventions to increase the pharmacological evidence in patients with HBP. There have been published several narrative studies on the subject (López-Romero et al. 2016; Soares et al. 2012; Herrera-Añazco et al. 2017). For the above, exploring whether there have been published interventions oriented to the pharmacological adherence on HBP will allow for the knowledge on this problematic to be expanded and highlight the elements to be considered when being designed, taking into account the specific characteristics of Latin America and the Caribbean.

With the aim of identifying interventions to increase the pharmacological adherence in patients with HBP, this article consists of a systematic review of all the literature about interventions orientated to increase the pharmacological adherence in adult patients who suffer HBP in Latin America and the Caribbean from 2000 to 2018.

Methods

Search strategy

The search of articles took place in April 2017 (English and Spanish terms) and in October 2018 (Portuguese terms) according to the Cochrane Manual Guidelines about systematic studies of interventions and PRISMA (Moher et al. 2009; Higgins and Green 2011). Searches on the following databases have been conducted: LILACS, SciELO, MEDLINE, Health Evidence, Cochrane Library and Embase. The terms of the search in English were *hypertension, medication adherence, patient compliance and therapy*, and they were researched on Medical SubHeadings (MeSH). The Spanish terms were *hipertensión, cooperación del paciente o cumplimiento de la medicación y terapia* and were researched on Virtual Health Library through the Social Sciences descriptors (DECS—by its acronym in Spanish). The Portuguese terms were Hipertensão, Cooperação do Paciente, *adesão à medicação, terapia*, and they were also researched on DECS. For the search, there were only used those terms that were described on the list of terms MeSH and DECS, given that these allow the use of common terminology for the appropriate search in three different languages: English, Spanish and Portuguese. Furthermore, the use of these terms provides a consistent and unique channel to recover the information according to the Virtual Health Library.

Exclusion and inclusion criteria

The study included articles in English, Portuguese and Spanish, published between 2000 and 2017, related to pharmacological interventions on hypertensive patients older than 17 years old, who at the time of the study were living in Latin America and the Caribbean. For the

purposes of this study, the term *adherence* was defined as the compliance with the medication that according to the DECS is understood as the patient's voluntary cooperation in taking the medication as it has been prescribed including time, dosage and frequency.

Furthermore, it was imperative that the studies described the interventions with the aim of increasing adherence to antihypertensive medications. It was verified that the adherence and control of HBP was reported in the results. Articles including pregnant women or patients with mental disorders were excluded. The study took place from 2000 onward, given that at the beginning of that year, the number of publications related to the subject increased (Conn et al. 2015).

Selection of studies

The selection of articles had three different filters, according to what Manual Cochrane suggests. The three authors of this study participated in the filtering process. *Firstly,* duplicated articles were all excluded. *Secondly,* the titles and summaries related to the inclusion and exclusion criteria were evaluated. *Thirdly,* to guarantee that the articles which made it to the second filter fully complied with eligibility criteria, two of the authors evaluated the articles independently and read them completely. When there was a discrepancy, third author was in charge of deciding whether the article was worth being included on the study or not. Previously, all authors did a test about inclusion and exclusion of articles with the purpose of unifying criteria and minimizing subjectivity. The percentage of success on authors during the test was 94%. The quality of the articles included in the systematic study was evaluated qualitatively according to the authors' criteria.

Data extraction

Data were extracted independently by two reviewers and later unified in a single database. All the information related to the articles such as country, design, duration, number of participants, diagnosis, definition of adherence, intervention in adherence, results of the adherence, group of drugs or name of antihypertensive drugs, control result, main obstacles for adherence and sociodemographic variables was included in the database. When there were two articles about the same study, the data were unified.

Results from the systematic study were analyzed under World Health Organization (WHO) proposals regarding behaviors related to the adherence to the medication (World Health Organization 2004). WHO grouped the obstacles for compliance in taking medications into five factors: (1) *patient's personal reasons*, (2) *health condition*, (3) *health staff/healthcare system*, (4) *therapy* (5) and lastly, *socioeconomic conditions.* All these factors were considered as a category of analysis of the obstacles reported in the articles.

Measurement in the quality of the articles

The quality of the articles included in this systematic study was evaluated through an adaptation of the Quality Assessment Tool for Quantitative Studies (Effective Public Health Practice Project 1998; Thomas et al. 2004). This tool was designed to evaluate the quantitative studies, specifically linked to public health.

Results

Descriptive

Of the 2077 identified articles, seven were included in the study (Fig. 1); 1817 were excluded as they did not comply with the eligibility criteria; and 1706 were done outside Latin America and hence also excluded. The final total of articles in the database was 24 studies, which included Latin American people who live in no Latin American countries, specifically the USA. These last articles were not taken into consideration given that the social dynamics and the access to and availability of health care in the USA could modify the related behaviors with pharmacological adherence. Programs that were taken into account were those designed and implemented in Latin American countries and the Caribbean. Of the seven included articles, four took place in Brazil (Amarante et al. 2010; de Souza et al. 2009; Obreli-Neto et al. 2011; Ortega et al. 2010), one in Chile (Soto et al. 2015), one in México (Mino-Leon et al. 2007) and one in Honduras (Reiger et al. 2015). Three of the studies included patients with concomitant conditions such as diabetes (Obreli-Neto et al. 2011; Mino-Leon et al. 2007).

The average duration of the reported interventions was 15 months. The shortest one took 6 months and the longest one 36 months. Regarding the number of participants, the samples sizes varied from 27 to 440 with an average of 178 participants (Table 2). In regard to gender, on average, 67% were women. The remaining sociodemographic variables of participants could not be reported given that the vast majority of the articles did not add enough information related to those variables.

Quality of the included articles

Most of the studies that were evaluated for this study were considered "*Weak.*" Only two articles were classified as *Strong*. The main aspects which affected the quality of the

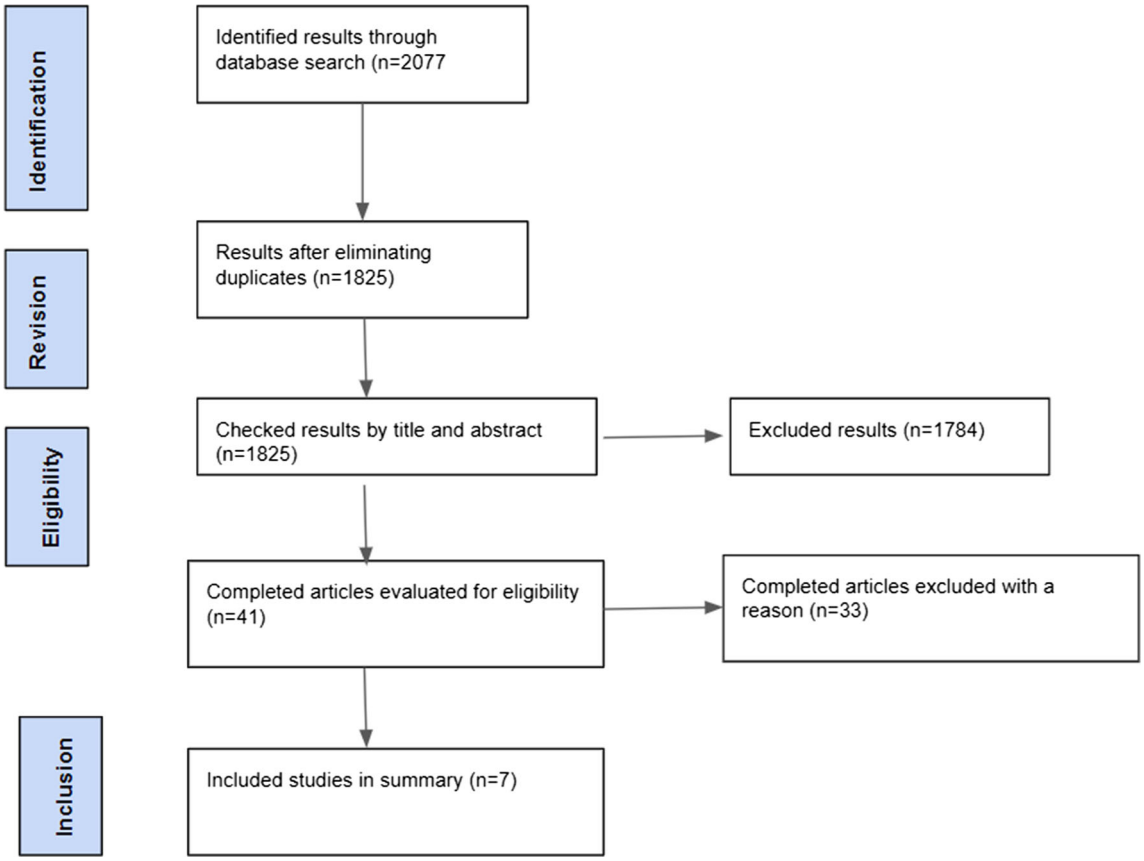

Fig. 1 PRISMA flow diagram of the search of literature about interventions to increase the pharmacological adherence on arterial hypertension. Latin America, 2000–2018

studies according to the evaluation criteria were the "blinding" of the participants or evaluators and the participant's withdrawal (Table 1).

Measurements to evaluate pharmacological adherence

The main differences noticed were found in the way pharmacological adherence is measured. Strategies used to measure pharmacological adherence were indirect; among them were pill counting (de Souza et al. 2009; Ortega et al. 2010; Soto et al. 2015), Morisky-Green's questionnaire (Amarante et al. 2010; de Souza et al. 2009; Obreli-Neto et al. 2011), closed questions such as "Have you taken your medication in the last 24 h?" (Reiger et al. 2015), pharmaceutical register (Obreli-Neto et al. 2011), self-taught compliance questionnaire from Haynes–Sackett (Amarante et al. 2010) and specific interviews to evaluate pharmacological adherence (Mino-Leon et al. 2007) (Table 2).

Table 1 Quality measurement of the studies included in the systematic review. Latin America, 2000–2018

References	Bias selection	Study design	Confusers	Blinding	Data collection	Withdrawals
Reiger et al. (2015)	Weak	Moderate	Moderate	Weak	Moderate	Strong
Ortega et al. (2010)	Moderate	Strong	Moderate	Moderate	Moderate	Strong
Soto et al. (2015)	Weak	Moderate	Moderate	Weak	Moderate	Weak
de Souza et al. (2009)	Weak	Moderate	Strong	Weak	Moderate	Weak
Mino-Leon et al. (2007)	Weak	Moderate	Moderate	Weak	Moderate	Weak
Obreli-Neto et al. (2011)	Moderate	Strong	Strong	Strong	Moderate	Strong
Amarante et al. (2010)	Weak	Strong	Weak	Weak	Moderate	Weak

Quality measurement of the studies included in this systematic review for Latin America between 2000 and 2015 was carried out through six items of the Quality Assessment Tool for Quantitative Studies

Table 2 Descriptive data of the studies included in the systematic study. Latin America, 2000–2018

References	Country	Number of participants	Duration of the intervention (months)	Study design
Reiger et al. (2015)	Honduras	86	30	Quasi-experimental
Ortega et al. (2010)	Brasil	354	12	Experimental
Soto et al. (2015)	Chile	50	6	Quasi-experimental
de Souza et al. (2009)	Brasil	44	6	Quasi-experimental
Mino-Leon et al. (2007)	México	440	6	Quasi-experimental
Obreli-Neto et al. (2011)	Brasil	200	36	Experimental
Amarante et al. (2010)	Brasil	27	12	Quasi-experimental

This table presents information about the studies included in the systematic review, the countries where they were carried out the researches, duration of interventions in months, studies design and the number of participants reported per the articles

Interventions in pharmaceutical adherence

Interventions considered for this study were noted for including complementary actions that authors declared were not included on the healthcare plan normally received. Reference group was those who received the usual treatment for the HBP control.

Studies that also identified different types of interventions so that the participants would comply with the antihypertensive treatment were added (Table 3). One of the studies implemented a program where the patients were

Table 3 Interventions to increase pharmacological adherence and blood pressure levels. Latin America, 2000–2018

References	Strategies used to increase pharmacological adherence	Adherence reported at the end of the study	Main barriers reported by the authors	Systolic blood pressure	*p* value	Diastolic blood pressure	*p* value
Reiger et al. (2015)	Community fund organization	76.2%	Abandonment of the study	0.39 mmHg	$p < 0.01$	(0.07)	$p = 0.21$
Ortega et al. (2010)	Calls to remind of the medication intake	85%	Abandonment of the study Nonattendance to the follow-ups	36 mmHg	$p < 0.000$	28 mmHg	$p < 0.000$
Soto et al. (2015)	Educational material and calendar to avoid forgetting the medication intake	46%	Nonattendance to the follow-ups	16 mmHg	$p < 0.001$	4 mmHg	$p = 0.06$
de Souza et al. (2009)	Sessions for the optimization of the use of medicines	Reported adherence: third session 84.5%; fourth session 100%	Does not report	14 mmHg	$p = 0.001$	6.4 mmHg	$p = 0.004$
Mino-Leon et al. (2007)	Advice with experienced pharmacists	52%	Health conditions Therapy	8 mmHg	$p < 0.001$	3 mmHg	$p < 0.001$
Obreli-Neto et al. (2011)	Group educational meetings	85%.	Therapy	0.8	$p < 0.001$	2.1	$p < 0.001$
Amarante et al. (2010)	Obtention of medical records, identification of problems with medications and intervention on them. Follow-up with the pharmacist and education	80%	Patient's reasons Therapy	24.8 mmHg	$p = 7302e-14$	13.3 mmHg	$p = 6163e-14$

This table presents the information about each article included in the systematic review, the percentage of adherence to the pharmacological treatment for blood pressure, the main barriers for the adherence and the blood pressure levels obtained after the interventions performed to increase adherence

closely and individually monitored as established in the pharmacotherapy work developed at Minnesota University (Cipolle et al. 2004) and group education every 6 months and conducted by the pharmacists. In these meetings, there were actions included to promote physical activity and healthy eating (Obreli-Neto et al. 2011). Some of these actions were based on discussions with the patients about the role of medication and their health, where they suggested new healthcare regimes, explained the correct use of the medication and made visual reminders to avoid forgetting antihypertensive medication intake.

On the other hand, Mino-Leon et al. (2007) with a group of patients with uncontrolled arterial pressure created a group of professionals (two doctors, two pharmacists and a family doctor) to evaluate and prescribe the treatment that each patient should receive taking into account whether they presented adverse effects related to the antihypertensive medication. Additionally, all the doctors who worked at the place where the study took place received special training on pharmacovigilance and every month patients were interrogated about the adverse effects related to the medication.

Ortega et al. (2010) proposed ambulatory monitoring of the patients. He made six telephone calls where the patients would receive information about HBP, and he clarified doubts related to the treatment; likewise, they were reminded about the visit they had every 2 months, initially by a nurse and then by a doctor. Patients also received magazines with health information. These magazines were sent periodically in the post. Patients were also invited to attend informative conferences with the participation on a disciplinary team. Furthermore, all patients received every 2 months free antihypertensive medication.

Regarding the proposal developed by de Souza et al. for a group of patients with resistance to the hypertensive treatment and those who were uncontrolled (> 140/90 mmhg), a specific monitoring was implemented via follow-up visits through a period of 6 months to evaluate and optimize the use of medication (de Souza et al. 2009). Patients would go to hospital every 35–40 days for study and advisory with an HBP-trained doctor to make adjustments to the dosage and to the medication when this was required. Additional to this monitoring process, at the beginning of the intervention, there were clinical interviews and there were geographic and anthropometric characteristics registered.

On the other hand, Reiger et al. proposed a community approach in a secluded area where the healthcare services were far away (Reiger et al. 2015). A group of leaders collected and administered the money obtained from a monthly fee membership to buy medication, hire a visiting doctor and cover administrative expenses. Doctor would provide services during the monthly meetings, and health community workers would give educational talks about hypertension, directed discussion groups and helped dispense medication, checked the patient's blood pressure and determined the patients' priority to be seen by the doctor.

Another intervention was Soto et al., in which every patient participated in three sessions of consecutive interviews of 30–45 min for a period of 4–6 months leaded by pharmacologists (Soto et al. 2015). During the first session, pharmacologists developed a pharmacological plan that included written information and educational material about how and when to take the medication as well as the correct amount, what is HBP, what are its causes and consequences and the purpose of treatment and its adverse effects. Furthermore, participants received a calendar with the aim of organizing and avoiding to forget the medication intake. During the second session, a pharmacological plan was discussed with the patients and family members were invited as well so they would be involved in the treatment. During the last session, the pharmacologists had a final discussion with the patients about how to continue with their pharmacological plans once the study was terminated.

Finally, Amarante et al. used a methodology of pharmacotherapeutic follow-up, which consists in obtaining the pharmacotherapeutic history of the patients to previously determine all health problems that could be presented and the medication the patients were currently using (Amarante et al. 2010). Once these problems were identified, the treatment was reformulated if necessary in order to resolve said problems and later evaluate the results.

Reported pharmacological adherence

Adherence percentage to hypertensive treatment in the intervened groups was very varied, ranging between 46 and 94%. For example, Obreli-Neto et al. (2011) and Ortega et al. (2010) found an adherence of 85%, Amarante et al. (2010) of 80%, Reiger et al. (2015) of 76.2%, Mino-Leon et al. (2007) of 52% and Soto et al. (2015) of 46%, while the results from de Souza et al. (2009) indicated that the controlled patients were mainly adherent during the whole study but uncontrolled patients presented with a high rate of adherence only during the third and fourth visits (84.5% and 100%, respectively).

Barriers in pharmacological adherence of HBP

Finally, the studies reported that the main obstacles for the adherence were the appointment compliance by the patients; also, the obstacle related to therapy reported by WHO (use of unnecessary medication, ineffective medication, very high or very low dosage or adverse reactions to the medication) affects the control directly. On the other hand, one of the studies reports that frequent forgetfulness

of the medication intake could be explained in part by the age of the evaluated patients given that all the studies included senior people (Amarante et al. 2010).

Control

Even though the aim of this study was focused on identifying interventions to increase pharmacological adherence in patients with HBP, studies also reported changes obtained in the control given the changes obtained in the adherence. It was observed that blood pressure was reduced in all the intervention groups included in this systematic study. Some articles reported a significant decrease for both systolic blood pressure (SBP) and diastolic blood pressure (DBP) (Amarante et al. 2010; de Souza et al. 2009; Ortega et al. 2010; Mino-Leon et al. 2007). The studies from Reiger et al. (2015) and Soto et al. (2015) presented a significant reduction only in SBP, while Obreli-Neto et al. (2011) did not report significant reductions in either of the types of blood pressure (Table 3).

Discussion

As far as it is known, this is the first systematic study that adds evidence about implemented interventions in Latin America and the Caribbean to increase the pharmacological adherence in patients linked to ambulatory programs for the HBP control. The main discoveries indicate that implemented interventions to increase the adherence are very varied. Likewise, a high variability in levels of adherence was found and we could evidence that indirect measurements were used. Lastly, it was evidenced that the obstacles for adherence were mainly associated with the adverse effects of antihypertensive medication, the dosage and forgetfulness of the medication intake given the age of the patients.

Based on the revised studies, the implemented interventions in patients with HBP to increase the pharmacological adherence in Latin America are mainly focused on remembering actions, follow-ups, creation of multidisciplinary groups including pharmacologists, free access to medication, follow-up calls, dosage formulation according to the needs and adverse effects that could be presented, joint purchase of medication, personal and group advisory regarding the illness, treatment and healthy habits. It was evident that these interventions increased the adherence, even though these discoveries are not new compared to other regions in the world where this is already being implemented.

Although the joint purchase of medication is a strategy that has been used for a long time and it has allowed to save commercial and transactional costs, as well as to facilitate negotiating prices and the same conditions for all buyers (Pan American Health Organization 2007; Sigulem and Zucchi 2009), this strategy has not been widely implemented in Latin American and Caribbean for the purchase of medicines for HBP (Pan American Health Organization 2007; Campos and Ortíz 2016); this may be due to its low cost versus other medications.

It should also be mentioned that worldwide efforts have been made to increase adherence to antihypertensive drugs. On the one hand, research has been carried out in the USA since the last century (Morrison and Wertheimer 2002), which has led to regional consensus to prevent, diagnose and treat HBP. As a result of those agreements, there is, for example, "The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure" (Chobanian et al. 2003). In this document, follow-up actions, monitoring, multidisciplinary work, adjustment of the dosage according to the needs and adverse effects and health education activities are suggested.

On the other hand, in Europe, the "2018 ESC/ESH Guidelines for the management of arterial hypertension" was published by the European Society of Cardiology and the European Society of Hypertension. This guide proposes similar actions to those of the Joint National Committee to improve adherence of the population of the region (Williams et al. 2018), while, in Latin America, criteria and interventions have not yet been unified to improve the adherence of its population.

Regarding the measures to evaluate, it was possible to determine that adherence in Latin America is being measured mainly indirectly in programs to control hypertension, despite the fact that some authors affirm indirect measures are the least reliable among all measures (Krousel-Wood et al. 2009). However, its low cost, simplicity, practicality, flexibility and its ability to provide feedback in real time have contributed to its frequent use in clinical practice.

Additionally, this study identified that levels of pharmacological adherence in patients with hypertension can vary considerably regardless of the intervention implemented; some non-Latin American authors have indicated that this may be due in part to an overestimation or underestimation of medication compliance as a result of the measurement instrument used. Overestimation of medication compliance may result in high adherence values, while underestimation may yield low values. In this systematic study, studies reported adherence values up to 100%, while in other regions of the world the adherence is close to 50% which could be showing an overestimation (Krousel-Wood et al. 2009).

Other possible explanations for high variability found in adherence values may be linked to the fact that self-

reported measures were the most used in the studies reviewed. Some limitations have been identified, such as memory bias and the tendency to evoke socially acceptable responses (Krousel-Wood et al. 2009). In addition, the skill levels of the interviewer and the construction of the questions that are asked can affect the validity of the results obtained. Therefore, it is suggested to supplement said information with more objective measures (Hawkshead and Krousel-Wood 2007).

Finally, it was found that the main barriers to pharmacological adherence were related to nonattendance to the follow-up appointments, adverse effects of medication, incorrect dosage and forgetfulness of taking the medication in elderly people. These findings are consistent with those reported by World Health Organization (2004), who identified that the adverse effects of medication are risk factor for not adhering to the treatment.

In terms of dosage and age as a barrier to adherence to the antihypertensive medication described in this study, other studies also suggest that the greater the number of medications and frequencies of daily dosage, the less likely it is to be adherent and that in fact, this can become even more complex in older adults given the risk of suffering from other health problems (World Health Organization 2004; Tedla and Bautista 2016).

Conclusions—implications to increase the adherence in Latin America

Based on the results found and the literature on the subject, it is evident that there is no single strategy to increase pharmacological adherence since the studies used different strategies. However, all strategies include accompanying processes on patients to make use of the medicine. This finding is related to that proposed by World Health Organization (2004), which states that a good healthcare system should have the capacity to educate and provide support and accompaniment to the patient to promote adherence to drugs (Ortega et al. 2014). However, health service providers do not always comply with these conditions, although it is assumed that if they do and their interventions are mainly limited to the delivery of medicines, they do not support the modification of behaviors and unfavorable environments (Holguín et al. 2006; Ordunez et al. 2015).

According to the results obtained and the evidence reviewed, it can be concluded that, although the Pan American Health Organization promotes plans for the management of hypertension aligned with global mandates, these may not necessarily respond to the characteristics of the region to increase adherence to pharmacological treatment, given that these are mainly focused on prevention and control (Ordunez et al. 2015). In this measure, it is required that studies respond to the characteristics of the region and take into account the ethnic, social and economic differences, and the multiple cultures that distinguish it. On the other hand, it is important to include in the Latin American consensus on hypertension, strategies to increase adherence and not only to remain in the description of the pharmacological intervention, since the results of this review demonstrate the importance of accompanying activities to medication treatments. Finally, given that decisions regarding healthcare programs are determined by multiple factors of the economic, social and cultural context, as well as the legal and regulatory framework (Arriagada et al. 2005), the strategies adopted for the increased adherence should be aligned with the public policies of each country and have clear guidelines for their implementation.

Limitations

Firstly, some primary investigations may not have recovered despite the exhaustive search because the present study included only terms retrieved from MeSH and ESCRs and did not take into account free terms or gray literature. A second limitation refers to the fact that the content of the intervention could have been incompletely coded due to the lack of information provided by the studies included in this article. Furthermore, inadequate description of interventions in some primary studies is a common problem in research reports of behavioral sciences (Atienzo et al. 2017). In addition, although this study reported blood pressure values, there was no discussion between adherence and control of blood pressure. A fourth limitation corresponds to the fact that the information on the number of medications and prescribed daily dosage found in the included studies is insufficient, so it is not possible to clearly determine the specifications of the medication administered and how these were related to the level of adhesion. Finally, the sociodemographic characteristics of the participants and their adherence results could not be linked given the lack of information reported in the studies.

Acknowledgements We gratefully acknowledge *De Todo Corazón* program from Research Group Factores Psicosociales en Psicología Clínica y de la Salud from Andes University, and, in particular, Diego Lucumi, Diana Agudelo, Susana Barradas y Graciela Mentz for their valuable comments during the development of this study.

Funding The funding was provided by Vicerrectoría de investigación de la Universidad de los Andes de Colombia (P15.853122.009/01).

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval This article does not contain any studies with human participants performed by any of the authors.

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