Adherence characteristics and reasons for abandonment of physical exercise-based interventions in older adults in Latin America: A scoping review

Características de la adherencia y motivos del abandono de las intervenciones basadas en el ejercicio físico en adultos mayores en América Latina: una revisión de alcance

Igor Cigarroa, **Rafael Zapata-Lamana, *Gonzalo Leiva-Gajardo, ***Eduardo Vásquez, ****Eva Parrado-Romero, *****Jaime Vásquez-Gómez, ******Christian Álvarez, *******Fanny Petermann-Rocha, **Daniel Reyes-Molina

*Universidad Santo Tomás (Chile), **Universidad de Concepción (Chile), ***Servicio Especializado en Psiquiatría y Adicciones (Chile), ****Universidad Autónoma de Barcelona (España), *****Universidad Católica del Maule (Chile), *******Universidad de Los Lagos (Chile), *******University of Glasgow (Reino Unido), ********Universidad Diego Portales (Chile)

Abstract. This review describes the adherence characteristics and reasons for abandonment physical exercise-based interventions in older adults in Latin America. This scoping review was conducted in accordance with the PRISMA statement. Articles were searched in MEDLINE by PubMed, ELSEVIER by SCOPUS and SciELO. The MeSH terms «Exercise», Exercise Therapy» and «Aged» were used between 2015 and 2020. We searched for articles in Spanish, English, and Portuguese carried out in people aged 65 years and over. 101 out of 4,642 randomized controlled trials (RCT) were included. A total sample of 5,013 older adults (79% women), with an average age of 68.2 years started their studies and 4,312 finished it, presenting an adherence to the interventions of 86%. Most of the studies were carried out in healthy older adults, in places enabled for the practice of physical activity, in charge of a physical activity professional, and the interventions were performed carried out through group therapeutic exercise. No article reported information on the minimum time of participation to the session to be considered as carried out. Only 30% of the articles reported the minimum participation of older adults in the intervention to include them in the study analysis, and 21% reported the average number of sessions attended to the intervention. The main reasons for abandonment were personal causes unrelated to the intervention. Only 5% of the articles reported injury of one of the participants (in two of them the injury was related to the intervention applied). This review characterized the physical exercise programs in older adults in Latin America, as well the adherence characteristics and the main reasons for abandonment to physical exercise-based interventions, by summarizing available evidence derived from RCTs.

Keywords: Aged; Exercise; Treatment Adherence and Compliance; Latin America; Scoping Review.

Introduction

Nowadays, all countries are experiencing an increase in the prevalence of older adults (OA) (United Nation, 2019a). In 2019 the number of people aged 65 years and older was 703 million worldwide; however, this is projected to rise to 1.5 billion by 2050 (i.e., from 9% to 16%) (United Nation, 2019a, 2019b). Latin America is not exempted from this phenomenon. In fact, for this same period, it is estimated an increase from 56.4 to 144.6 million, leading to an increase of 156% of OA in the region (United Nation, 2019b). Aging is a heterogeneous process related to the health condition of each individual. Thus, significant differences in health status and functional capacity have been described in people with the same chronological age (Mitnitski et al., 2002). This phenomenon is known as pathological aging. On the other hand, half of the world’s deaths are attributed to diseases associated with aging (Costantino et al., 2016; Huang et al., 2010).

Physical inactivity (PI) in the older population (i.e., less than 150 minutes of moderate-intensity aerobic physical activity or less than 75 minutes of physical...
activity vigorous-intensity aerobics per week) has been recognized as one of the main causes of physical, cognitive and functional impairment in this population (WHO, 2020). Additionally, PI is one of the most common causes of the heart disease, type 2 diabetes, chronic obstructive pulmonary disease, stroke, frailty syndrome, sarcopenia, Alzheimer’s disease, cancer, chronic kidney disease and depression (McPhee et al., 2016). Although multiple studies have reported physical exercise (PE) in OA with varied results, the majority has concluded that PE decreases with aging (Sun et al., 2013). Therefore, it is proposed that PE practice on a regular basis reduces the mortality rate from all causes, disability, cardiovascular disease, and cognitive and functional impairment in OA (Mora & Valencia, 2018).

Among the benefits of the regular practice of PE through different programs, studies have reported a lower risk of falls, improves balance and function (Hill et al., 2015), increases strength and maximum oxygen consumption (Fleg, 2012), improves and prevents sarcopenia (Landi et al., 2014). PE has also been associated with benefits in the psychosocial and cognitive aspect in this population, reducing symptoms of depression (Araque-Martínez et al., 2020; da Silva et al., 2019), preventing cognitive deterioration (Romero Ramos et al., 2020; Van Gelder et al., 2004), and increasing quality of life (Galloza et al., 2017).

Based on the above, it is proposed that all OA should perform PE to obtain the benefits that this entails - unless there are contraindications to do so. In Latin American countries, public health and PE institutions guide the community regarding PE realization to improve endurance, strength, balance, flexibility and quality of life in OA (ACEMI, 2011; Dirección de Promoción de la Salud y Control de Enfermedades No Transmisibles, 2013; Gobierno de Chile, 2017; Ministerio de Salud Pública del Ecuador, 2011; Secretaria Nacional de Deporte, 2018), proposing as alternative activities the ones in the aquatic environment (Secretaria Nacional de Deporte, 2018). Several studies have also been conducting programs using multi-component PE, where aerobic capacity, flexibility, balance, strength, and cognitive performances were increased, decreasing on the other hand symptoms of depression or anxiety (Bueno et al., 2018; Carvalho et al., 2009; Gonçalves et al., 2019; Nacional Costa Rica et al., 2018; Rico-Gallegos et al., 2020; Salinas et al., 2005).

However, to obtain the known benefits of PE, a continues participation in intervention programs is required. This is when we must understand the term «adherence», which can be understood as maintaining a regimen or exercise program for an extended period after an initial phase of adaptation has been completed (Lox et al., 2014). However, OA have a higher burden of comorbidities, lower social support, and higher disability and depression rates. These factors have been associated with lower adherence to exercise in people with specific health conditions (Picorelli et al., 2014). Other factors that have also been described as limiting the participation in PE-based interventions in this population are related to lack of time and motivation, boredom, fear of falling, and environmental factors such as accessibility, cost, and safety (Valenzuela et al., 2018).

Although there is recent evidence global focused on adherence to PE-based interventions, this evidence focused only on particular health conditions or programs of certain characteristics (Di Lorito et al., 2020; Hong et al., 2008; Medina-Mirapeix et al., 2009; Nicolson et al., 2017; Valenzuela et al., 2018). Currently, there is no review of the literature that reveals the available evidence on adherence and reasons for the abandonment of PE-based interventions for OA in Latin America. Therefore, this review aimed to describe the adherence characteristics and reasons for abandonment to PE-based interventions in OA in Latin America.

Survey methodology

The scoping review was carried out under the guidelines established by PRISMA declaration (Liberati et al., 2009). The PRISMA checklist can be found in the supplementary article files (Appendix 1). The manuscript was not registered in PROSPERO. PROSPERO does not currently accept registrations for scoping reviews, literature reviews or mapping reviews.

Search strategy for identifying articles

The following databases were reviewed and presented in the following order: MEDLINE by PubMed, ELSEVIER by SCOPUS and SciELO. The search covered the period from 2015 to 2020. For the development of the research, the MeSH terms were used: «Exercise», Exercise Therapy» and «Aged». The search strategy followed the guideline of Peer Review of Electronic Search Strategies (PRESS) (McGowan et al., 2016).

The general search syntax was: «Exercise» OR «Exercise Therapys» AND «Aged» and was adapted to each database by applying the following filters: a) PubMed: Type of article: randomized controlled essay,
Publication date: five years, Languages: English, Spanish and Portuguese, Age: aged: 65+ years and 80 and over.

b) Scopus: Exclusion: Medline, Year of publication: 2015 to 2020, Publication status: final, Document type: article, Country: Latin American countries, Languages: English, Spanish and Portuguese, Keywords: words related to the subject under study. c) SciELO: Country: Brazil, Colombia and Chile, Year of publication: 2015 to 2020, Literature type: article.

Search strings for all databases is shown in the supplementary material (Appendix 2).

**Study selection**

The inclusion criteria were as follow: I) Intervention; Ia) Type of intervention: Endurance, strength, multi-component, concurrent, multidomain, HIIT or neuromotor, or other related to physical activity or exercise, Ib) Distinctive intervention: Must be the only intervention to use based on physical activity or exercise (no other interventions), Ic) Period of time: last at least for four weeks. II) Age: men and women 60 years and older who are community-dwelling older adults, living in long-term care, residential homes, or have been hospitalized with different health status. III) Type of article: Randomized controlled clinical trial, IV) Country of origin: Only Latin-American countries, V) Languages: English, Spanish and Portuguese. Revisions, editorial documents, protocols, or thesis were excluded.

**Data extraction**

In the first step, duplicate articles were removed from databases using Mendeley. According to the inclusion and exclusion criteria, all titles and abstracts were screened for suitability by two reviewers (G. L-G and I.C). In the next step, articles that met the inclusion criteria were selected, and, when decisions could not be taken using only the title and abstract of the article, the full-text was retrieved. The included articles were independently verified by the two reviewers (G. L-G and I.C); however. A consensus was achieved when there was a disagreement. The flowchart proposed by the PRISMA was used to show the search for articles (Figure 1). A standardized questionnaire was applied by the reviewers to extract the data from the included articles, in order to synthesize the evidence.

**Risk of bias assessment tool**

The Cochrane Tool «The Cochrane Manual of Systematic Reviews of interventions» (Sterne et al., 2019) was used to assess risk of bias. This tool allowed an assessment of the methodological validity of the 101 articles included in this review (Figure 2). The instrument consists in six items that evaluate: a) selection bias, b) completion bias, c) detection bias, d) wear bias and e) notification bias and f) other biases. However, for this review, the item «other Biasess» was not considered due to characteristics of the interventions analyzed. Each article was scored independently by two reviewers (G. L-G and I.C), and scores were compared. When there was a disagreement, a consensus was achieved. A detailed description of the analysis is presented in the results section, along with a graphic representation. The risk of bias was measured using three categories: low risk (green color), unclear risk (yellow color), high risk (red color) according of weighted bar plot of the distribution of risk-of-bias judgements within each bias domain of Cochrane tool (Sterne et al., 2019).

**Strategy for narrative synthesis**

A summary of the articles’ main findings included, related to adherence and grounds for abandonment of OA in PE-based interventions in Latin America, was provided. The main information is presented in figures and summary tables. The information extracted included: (a) general characteristics of articles and OA (Table 1); (b) Characteristics of PE-based intervention associated with adherence (Table 2); (c) reasons for the abandonment of PE-based interventions (Table 3); (d) characteristics of PE-based intervention associated with adherence and reasons for abandonment (Table 4); (e) Profile of PE-based intervention with adherence of 100% and less than 70% (Table 5).

**Results**

**Literature research**

Figure 1 shows the flowchart proposed by the PRISMA Declaration. A total of 4,642 potential articles on
physical activity and physical exercise were identified in OA from Latin American. Following the exclusion of duplicates in the databases, the screening and eligibility criteria were applied. 101 articles were finally included for the narrative synthesis in this review (Figure 1).

**Risk of bias assessment**

Regarding the analysis by type of bias, it can be seen that the distribution of biases classified as low risk or unclear risk was similar, except for the performance bias that presented an 86% unclear risk, and the reporting bias, which presented 100% low risk. Only three types of components had high-risk of bias (selection, performance and detection), although for all cases, it was less than 10% (Figure 2).

**General characteristics of the articles and Older Adults (OA)**

A total of 101 articles were included in this scoping review corresponding to 5,013 individuals (79% women) with an average age of 68.2 years (age ranged from 63.6 to 84.8). A total of 91 studies were conducted in Brazil, live in Chile, two in Colombia, two in Mexico and one in Ecuador. Regarding the distribution of the age range of the selected OA, 97% of the articles included OA from 60 years or more, of these 70.83% included OA between 71 and 80 years, and 16% included OA older than 80 years. A total of 72% of the studies were conducted in OA without underlying pathology as the objective of the study, while 28% of the articles reported having performed intervention on OA with a particular health status. Among this health status, non-communicable diseases (NCDs) were those reported in the majority of the studies (53.6%), followed by neurodegenerative diseases (32.1%), musculoskeletal diseases, and cancer (10.7% and 0.69%, respectively) (Table 1).
Characteristics of PE-based interventions associated with adherence

A total of 67% of the articles reported the exclusion criteria used to delimit the sample, 5,013 older adults started their studies and 4,312 finished it, presenting an adherence to the interventions of 86%. A total of 88% of the articles (n=30) had complete adherence to the interventions equal to or greater than 70%. Of these, only 40% of the articles (n=36) reported complete adherence to the intervention (100%). No article reported information on the minimum time of participation to the session to be considered completely. On the other hand, 30% (n=30) of the articles reported the minimum requirements for participation in the interventions, to be considered in their analyses. In this sense, on average the minimum percentage of participation required by the studies was 77%. This percentage was lower compared to the effective percentage of attendance to the interventions (87%). However, this information was declared only in 21% of the articles (n=21) (Table 2).

Reasons of OA for abandonments during the PE-based interventions

A total of 66% of the articles reported the abandonment one or more OA during the PE-based intervention. On average, 13% of OA that initiated the intervention left for different causes. The main causes include lack of time, moving to another city, and lack of motivation (336 OA). Health reasons were indicated as reasons for abandonment in 35% of the articles (140 OA), followed by attendance to other intervention (181 OA). Additionally, two studies reported death of participants during the intervention period, none related to the intervention while five studies reported injury of one of the participants (in two of them, the injury was related to the intervention applied) (Table 3).

Characteristics of PE-based intervention associated with adherence and reasons of abandonment

Only 36 studies reported where the intervention took place and categorized into places enabled or not enabled for PE practice. A total of 88.6% of these articles (n=31) involved...
Profile of PE-based interventions with adherence of 100% and less than 70%

About 36% of the articles had a 100% adherence to the intervention, while 11% had an adherence <70%. For both adherence conditions, OA’s predominant characteristics were similar, between 60 and 70 years, with the presence of underlying pathology during the intervention period. As for the characteristics of the intervention, it was evident in both interventions that the...
The key findings of this review were that total adherence to the intervention was 87%. No article reported adherence to the session. Only 30% of the articles reported the minimum percentage required to be included in the study analysis. The main reasons of abandonment to the PE-based interventions were personal causes unrelated to the intervention. Additionally, a low percentage of OA deaths was observed during the intervention, none related to exercise programs and a low percentage of injured OA was detected. On the other hand, most of the PE-based interventions were developed in spaces set up for PE practice, in charge of a physical activity professional, in a group modality and using therapeutic exercise as a base intervention. The most frequently used parameters for PE-based interventions included intervention length of three or fewer months, with an intervention frequency of three or fewer times a week, and a session length of 60 minutes.

Discussion

Main results of this review
What was already known and contrasted with the findings of this review?

Regarding the general characteristics of the articles, it should be noted that they were developed in only five countries in Latin America, where 91% correspond to Brazil, which could be associated with the fact that it is the country that develops the most research in the region (Grupo Banco Mundial, 2019). Only 16% of the interventions included OA over 80 years old, a fact that attracts attention as it is known that the PE brings both physical and psychosocial benefits in OA no matter the age of subjects (Mora & Valencia, 2018; Van Gelder et al., 2004). This could be because as age progresses, the health condition changes and the presence of chronic diseases increases in OA (Peranovich, 2016), which could lead to an increased risk of unwanted side effects associated with PE practice, although these should be minimized by adapting interventions individually to the needs and characteristics of participating subjects (Van Gelder et al., 2004). In terms of sex distribution of each intervention, studies included more women (79%) than men. Regarding OA’s health condition recruited for interventions, the highest prevalence was a 15% of chronic NCDs, followed by neurodegenerative diseases, which is consistent with the phenomenon of progressive ageing population (Peranovich, 2016). In terms of remaining conditions, only 3% and 1% developed OA interventions with musculoskeletal diseases and cancer, respectively. This could be due to some key factors common in subjects with these conditions, such as physical discomfort and fatigue, among others (Buffart et al., 2014). Other reviews have also managed to identify very few studies in these particular health conditions in OA (Forbes et al., 2020; Nicolson et al., 2017), which draws attention due to the high prevalence of these diseases today.

A total of 67% of the articles report exclusion criteria. This is consistent with previous reviews that demonstrated exclusion criteria defined in 69 out of 101 selected articles (Porzsolt et al., 2019). The importance of correctly defining exclusion criteria in clinical trials lies in integrating characteristics of subjects prone to lose during intervention or follow-up for various reasons, which, if not applied correctly, could increase the risk of both adverse events and biased results (Patino & Ferreira, 2018). The average adherence to PE intervention was 87%, using as a measurement method the percentage of subjects who completed the intervention, values identical to previous studies (Hong et al., 2008). However, other studies have highlighted the varied methodology used to measure adherence to interventions (Findorff et al., 2009; Picorelli et al., 2014), including the percentage of subjects who completed the intervention, the percentage of attendance at available sessions and the average number of attendance sessions per week. Concerning session adherence, no article in this review reported adherence to the session, which is in agreement with previous systematic reviews where this factor is not considered (Hong et al., 2008; Picorelli et al., 2014). Besides, only 21% of the articles detailed the average percentage of sessions attended, which averaged 87%, which is consistent with averages obtained in previous reviews (Hong et al., 2008; Picorelli et al., 2014). On the other hand, only 30% of articles reported the minimum percentage required to be included in the data analysis, information of great value to know the effective participation of OA, which should be recorded in future interventions.

A low percentage of OA deaths was observed during the intervention. None related to exercise programs and a low percentage of injured OA was detected, which could indicate that the PE-base interventions in Latin America interventions are safe, reliable and potentially replicable (Peranovich, 2016). The reason for abandonment corresponding to personal causes was reported in 49% of the articles, where they were considered in the same line as previous studies, aspects such as lack of time, traveling problems or lack of motivation (Hancox et al., 2019; Picorelli et al., 2014) as well as health reasons (cause reported in 35% of the articles), but which, as it has highlighted, not derived from the intervention applied. For attendance, 25% of the articles reported excluding OA for this reason and, finally, only 5% of the articles reported OA exclusion whose abandonment was motivated by the intervention.

While elimination by attendance is not considered a barrier to adherence to the PE-based interventions, it would be logical to infer that the non-attendance could...
be due to reasons not informed by the OA and related to both personal characteristics and sociodemographic factors presented in their environment (Findorff et al., 2009).

Although some studies have shown good results in terms of adherence and impact of OA interventions carried out both at home and in residential centers (Faber et al., 2006; Hill et al., 2015), it was not possible to establish relationships between the place of intervention and OA adherence due to a large number of articles that did not report this information, coupled with the fact that only one article used an PE-based intervention performed at the home of the OA. As for the intervention format, the preference for using group interventions may be given by the social support that could occur between OA, which is an important factor in promoting adherence to the PE-based interventions in this population (Fraser & Spink, 2002), in addition to the reduced use of time and resources of this format compared to individual interventions. Finally, concerning the type of intervention used, 63% of the articles used structured PE-based interventions, which is characterized by being a planned and structured activity, to improve or maintain physical fitness or any of its components (WHO, 2020), 25% of the articles used interventions based on therapeutic exercise, which is characterized by being used to recover function in subjects with certain health conditions (Taylor et al., 2007). Only 13% of the articles made interventions through recreational activities, which could be based on researchers’ interest in knowing the effects of structured and therapeutic PE on elderly, controlling the different variables that could affect the results obtained with the interventions.

The interventions’ design–mainly group session in those who reported a 100% adherence versus individual session in those with 70% - might explain the adherence difference. Apparently doing physical activity in other OA companies and receiving their support and companionship would be an important factor in increasing adherence (Fraser & Spink, 2002).

What are the contributions and scope of this review?

This scoping review provides a broad and updated view of the characteristics of PE-based interventions that are being developed in Latin America, which made it possible to generate a profile of the OA that most benefit from PE programs, the characteristics of adherence and most frequent reasons for abandoning these interventions. In addition, this review allowed us to know the existing gaps in relation to the attendance record and reasons for abandoning the OA to PE-base interventions, being able to encourage the development of future studies in this area, as well as their inclusion as relevant factors when designing and prescribing PE-base intervention for this population.

Strengths and limitations

The work was conducted according to the PRISMA guidelines and it was not limited to one language only; therefore, the language bias risk was minimal. We found that the search was restricted to the last five years to find the latest and updated available evidence among the limitations. We are aware that there may be high-quality evidence in previous years that was not included. Furthermore, this scoping review lacked meta-analysis due to the studies’ heterogeneity, so there is only a qualitative analysis of the phenomenon studied.

Conclusions

Total adherence to interventions was 87%. No article reported information on the minimum time of participation to the session to be considered as done. Only 30% of the articles reported the minimum participation of the OA in the intervention to include them in the study analysis and 21% reported the average session attendance to the intervention. The main reasons for abandonment were personal causes unrelated to the intervention. A low percentage of OA deaths was observed during the intervention, none related to exercise programs and only 5% of the articles reported injury of one of the participants (in two of them the injury was related to the intervention applied). Most of the PE-based interventions were developed in spaces set up for the practice of PE, in charge of a physical activity professional, in a group modality and using therapeutic exercise as a base intervention. The most frequently used parameters for PE-based interventions included intervention length of three or fewer months, with an intervention frequency of three or fewer times a week, and a session length of 60 minutes.

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