Cómo citar este artículo: Gamonales, J.M., Hernández-Beltrán, V., Gámez-Calvo, L., Peguero-Perejo, J.M., Rojas-Valverde, D., & Muñoz-Jiménez, J. (2025). Inclusion of students with achondroplasia in the early childhood education system: a systematic review. *RETOS XXI*, 9, 1-28.

INCLUSION OF STUDENTS WITH ACHONDROPLASIA IN THE EARLY CHILDHOOD EDUCATION SYSTEM: A SYSTEMATIC REVIEW

INCLUSIÓN DE LOS ALUMNOS CON ACONDROPLASIA EN EL AULA DE EDUCACIÓN INFANTIL. REVISIÓN SISTEMÁTICA

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Fecha de recepción: 08/09/2023; fecha de aceptación 14/08/2024

Abstract

The inclusion of people with achondroplasia has become a widespread educational policy worldwide, but the inclusion of these students is often underestimated and overlooked. Therefore, this study aimed to comprehensively summarise the available literature related to the procedure used to include students with achondroplasia in the Early Childhood Education system. The evidence search was conducted using the following keywords: "child education" and "Achondroplasia". For inclusion, articles

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had to be published until December 2022 and available in Web of Science, Scopus and Pubmed as the most commonly used databases. They were included or excluded based on specific established criteria to select suitable manuscripts. After an in-depth analysis, the systematic review finally included seven manuscripts. The results agreed on the fundamental role of inclusion processes of children with achondroplasia in Early Childhood Education classrooms. For this, different adaptations must respond to the diversity of potentialities and needs of each student, increasing participation in learning processes and the educational community. Some adaptations in the school environment included classroom chairs (e.g., size, steps), benches to reach tables, canteens, bathrooms, and washbasins. Also, early intervention professionals in the classroom could better comprehend development limitations awareness, independence skills development, and self-esteem improvements.

Keyword: skeletal dysplasia, disability, special education, adapted education.

Resumen

La inclusión de las personas con acondroplasia se ha convertido en una acción educativa generalizada en todo el mundo, pero la inclusión de estos estudiantes a menudo se subestima y se pasa por alto. Por ello, el presente trabajo tiene como objetivo reunir de forma integral la literatura relacionada con el procedimiento para incluir a los alumnos con acondroplasia en el sistema de Educación Infantil. La búsqueda de evidencia científica se realizó utilizando las siguientes palabras clave: "Educación infantil" y "Acondroplasia". Para su inclusión, los documentos debían estar publicados hasta abril de 2022 y estar disponibles en Web of Science, Scopus y Pubmed como las bases de datos más utilizadas. Fueron incluidos o excluidos en base a criterios específicos establecidos para seleccionar los manuscritos más adecuados. Después de un análisis en profundidad, la revisión sistemática finalmente incluyó siete manuscritos. Los resultados mostraron el papel fundamental de los procesos de inclusión de los alumnos con acondroplasia en las aulas de Educación

Infantil. Para ello, diferentes adaptaciones deben responder a la diversidad de potencialidades y necesidades de cada alumno, aumentando la participación en los procesos de aprendizaje y de la comunidad educativa. Algunas adaptaciones en el entorno escolar incluyeron sillas de aula (por ejemplo, tamaño, escalones), bancos para alcanzar mesas, espacios para comer adecuado, baños y lavabos adaptados. Además, los profesionales de la Atención Temprana en el aula podrían ayudar a comprender mejor la conciencia de las limitaciones del desarrollo, el desarrollo de habilidades de independencia y las mejoras en la autoestima.

Palabras clave: *displasia esquelética, discapacidad, educación especial, educación adaptada*

INTRODUCCIÓN

Achondroplasia (AC) is the most common skeletal dysplasia (Okenfuss et al., 2020), associated with short stature and severe anatomical disproportion (Medina et al., 2017; Yanes et al., 2010). It is caused by a genetic mutation in the gene that encodes the fibroblast growth factor receptor type 3 (FGFR3) (Cialzeta, 2009; Horton, 2005). Furthermore, other bone defects may occur, including a disproportional skull size, a small length of fingers and the presence of lordosis (Vázquez & Espinoza, 2016), causing physical disability (Rincón-Rueda et al., 2021). Due to the limitations caused by these structural body deformations, people with AC usually suffer significant social difficulties, evidenced at work and school (González & Hernández, 2001). Besides, the incidence of AC is estimated at 1 in 30,000 births (Horton et al., 2007; Ireland et al., 2014). Therefore, because of the physical and psychological characteristics of people with AC, some difficulties in their participation in physical and sports activities are also present (Haga, 2004; Takken et al., 2007; De Vries et al., 2020).

Studies related to the physical-sports practice of people with AC are limited (De Vries et al., 2020). Commonly, studies focus on physical condition profiling as the main objective (Sims et al., 2018). Also, most of the current investigations agree

that the participation of people with AC in physical-sport activities is relatively low (Ireland et al., 2011; Takken et al., 2007). Therefore, children with AC must receive early attention, with special awareness of areas related to motor skills development (Marco-Arenas et al., 2018). Educational programs are ideal for motor skills training since they positively influence students in intellectual, affective, and social development (Cabrera & Dupeyrón, 2019). In addition, it is a fundamental tool for the inclusion of students with disabilities (Gamonales, 2016). Therefore, the training of motor skills in students with disabilities allows the acquisition of basic motor skills for their development and knowledge of their own body, improving their sense of orientation (Gamonales, Gil-Sánchez et al., 2018). Also, professionals must perform some adaptations in activities for those students with disabilities to fully develop their abilities and skills (Gil-Espinosa, Romance & Nielsen, 2018). In the same way, the teacher should facilitate greater possibilities of participation of these students, enhancing their abilities and skills and not their difficulties (Ríos-Hernández, 2007). In this way, it will evolve into an adapted and inclusive school (Gamonales, 2016).

Therefore, it is important to work on motor skills in the Early Childhood Education stage (ECE) to benefit all students. It allows the inclusion and integration of students with disabilities, improving their physical and mental health (Álvarez & Pazos, 2020). The educational system does not guarantee students real equality in schools, with people with disabilities being the most discriminated group (Crosso, 2014). It will be essential to work on positive attitudes toward diversity in professionals, peer groups and family members (Silva-Ortiz et al., 2020).

Due to the lack of manuscripts related to the inclusion procedures of students with CA in the educational system, the purpose of this review was to comprehensively summarise the available literature related to the procedure used to include students with achondroplasia in the Early Childhood Education system.

METHOD

Design

This systematic review was based on theoretical studies (Montero & León, 2007), carrying out a research process and compilation of scientific papers using the "Data accumulation and study selection" model (Ato et al., 2013), to collect the

largest manuscripts related to the inclusion of students with AC.

Search Strategy

The sample considered articles from scientific journals published until December 2022. A total of 882,203 studies were found in the first search phase among the three databases (PubMed, Scopus, Web of Science), using the first term selected, "*Child Education", and in*cluding the second keyword ", *Achondroplasia*", using the Boolean word AND. Finally, 92 manuscripts were identified in this first step. As expected, as the different keywords were introduced in the search strategy, the number of manuscripts were considerably reduced. Finally, the inclusion and exclusion criteria for the selection of the studies established by the researchers were applied (see Table 1), considering seven studies that met the criteria and were considered as valid for this systematic review.

Criteria for study selection

The documents selected had to meet the inclusion and exclusion criteria established in the study (see Table 1).

Table 1.
Document inclusión and exclusión criteria

Nº	Inclusion criteria
1	Scientific articles
2	Mention at least some of the characteristics of students with AC (50 words minimum).
3	Wrote in Spanish, English, or Portuguese language (or allowing translation).
4	Full text or abstract available
	Exclusion Criteria
5	Eliminate documents in which only the keywords entered in the databases were mentioned
6	Dismiss documents that cannot be referenced (e.g., meetings reports, presentations).
7	Exclude manuscripts that only refer to people with AC in general.
8	Eliminate duplicates

Codification of the variables

The extracted manuscripts were classified according to different criteria (Table 2):

- General variables (*Author/s, Year, Title* and *Abstract*).
- Manuscript-specific variables (*Keywords*, *Databases*, *Accessibility*

of the document, *type of document*, *type of study*, *Ethical Committee from the University*, *Description of the sample* and *Participants*).

- Variables related to the subject of study (*Inclusion of students with AC* and *Type of inclusive activities*).
- Variable related to the quality of the selected documents (*Quality of the documents*).

Table 2.
Characteristics of the variables of the systematic review study related to the inclusion of students with AC in the classroom of ECE.

Variable	Acronym	Description
General variables	Author/s	Scientific name of each author of the selected document.
	Year	Year of publication of the selected manuscript.
	Title	Publication title of the selected document.
	Resume	Brief writing that gathers the main ideas of the selected manuscript.
Manuscript-specific variables	Keywords	Terms that appear in the selected document.
	Database	Data platform in which the manuscript is located.
	Document accessibility	Full text availability (Yes/No).
	Document type	Classification of documents according to the type of manuscript based on Gamonales, Muñoz-Jiménez et al., (2018): Doctoral thesis, Book, Book chapter, Academic project, Congress Publication, Journal article, Patent document.
	Type of study	Classification of the manuscripts according to the type of study based on Montero & León (2007): Theoretical studies, Empirical studies with quantitative methodology and Empirical studies with qualitative methodology.
	University Ethics Committee	Does the manuscript refer to an Institutional Review Board rand approval (registration number/code)?
	Sample Description	Does the sample is described in detail (Yes/No).
	Participants	Mention of the number of documents or participants that form part of the study.
Variables related to the subject of study	Inclusion of students with AC	Mention the existence of inclusion criteria of students with CA in ECE. classes (Yes/No).
	Type of inclusive activities	Describe the activities to include students with AC in the ECE classroom.

Variable related to the quality of the documents	Quality of the selected documents	Based on expert criteria, the quality of the selected manuscripts was evaluated.

Registration procedure

The guidelines to perform a systematic review is quite accepted in different areas (Benet-Rodríguez et al., 2015; Benito-Peinado et al., 2007; Moher et al., 2009; Schmid et al., 2020). However, these methodologies and procedures not always are as simple, intuitive, and easy to use as preferred. For this reason, some recent literatures have been considered, as they propose a useful, easy, and affordable systematic review model Gámez -Calvo et al. (2020), and Gamonales, Muñoz-Jiménez et al. (2018). This systematic review followed a series of phases based on well-known evidence (Thomas, Nelson & Silverman, 2015) (Figure 1).

Figure 1. Search procedure related to the inclusion and selection of manuscripts.

Phase 0. Topic selection. It is one of the most important steps to organize the most significant information to be reviewed and the objectives that justify the systematic review. Also, it establishes the seach procedure. In addition, in this process, researchers have the responsibility to systematically review the

scientific and non-scientific literature available and communicate the most important advances (Benet-Rodríguez et al., 2015), since it can help and determine future research (Gamonales et al., 2021).

Phase 1: Planning and selection of keywords. The identification of keywords is critical in a systematic review process. Therefore, for the selection of keywords, the proposed objectives and their agreement with the selected keywords were considered. For this reason, two keywords were selected for the search. These words have been selected in English to increase the potential included papers, obtaining greater results, since the titles and abstracts of the documents are usually written in several languages but mostly in English. The chosen terms were: "*Child education*" and "*Achondroplasia*". These words were entered in the same order in the different databases, in order to obtain the greatest number of results, as has been done in previous reviews (Gámez-Calvo et al., 2020; Gamonales et al., 2021; Hernández-Beltrán et al., 2021).

Phase 2: Search in databases. Two searches were performed considering the inclusion of students with AC in the ECE system in the following databases: *WOS*, *Scopus,* and *PubMed*. For this, the same Boolean search (*AND)* was used in the different digital platforms. The final search phrase was: "*Child education - and - Achondroplasia*". Figure 2 shows the search procedure in each of the databases, as well as the manuscripts identified. Finally, the *inclusion and exclusion criteria* were applied, and the duplicate documents were eliminated. Therefore, the final number of selected manuscripts was 7 after a full text review and analysis. However, the number of documents was not large, allowing the treatment of information and avoiding contamination by researchers (Benito-Peinado et al., 2007).

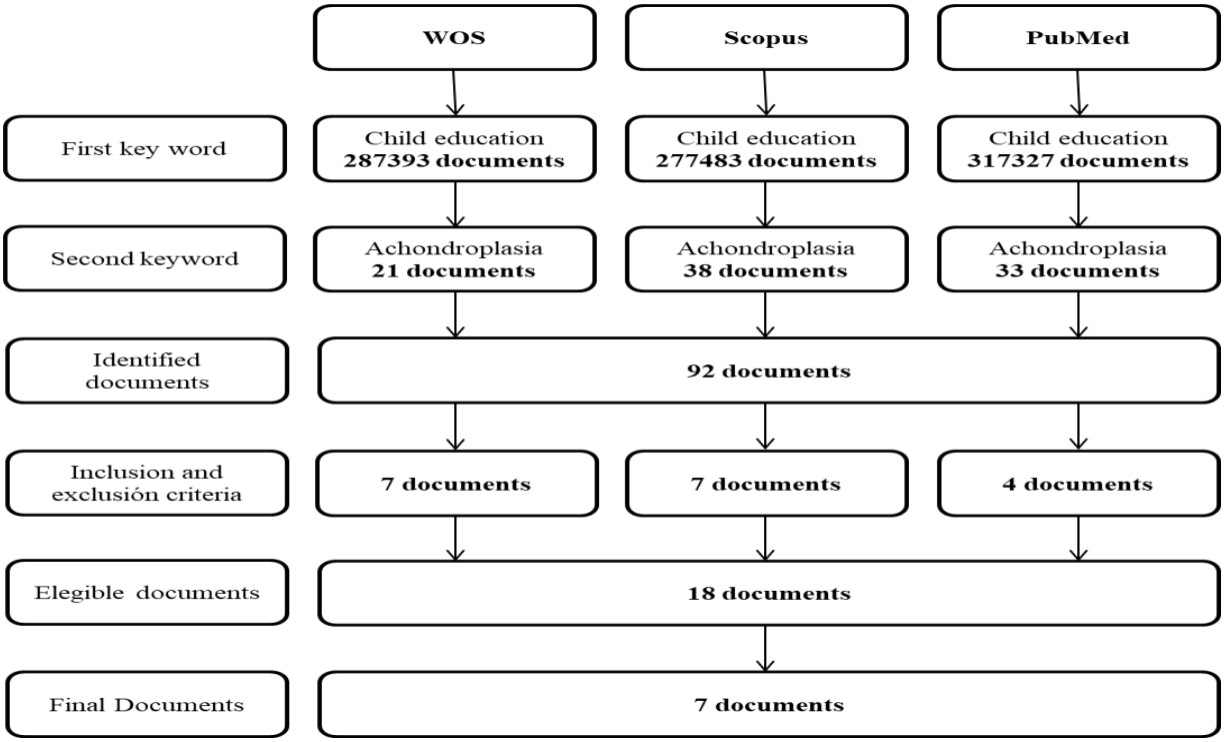

Figure 2. Search procedure of manuscripts by data base.

Phase 3: Access to documents. The manuscripts were assessed using the institutional library service. When the access using this mean was not possible, the authors contacted the main authors of the papers using other scientific spreading platforms such as *ResearchGate*, where the published data is usually available (Gámez-Calvo et al., 2020; Gamonales et al., 2021; Hernández-Beltrán et al., 2021; Jenkin et al., 2017).

Phase 4: Information Treatment. Each of the documents selected in the search was analysed and classified according to different variables (Table 2). All this flow of information was compiled in an Excel file, for a more affordable data management, making easier future handling and analyses (Gamonales et al., 2018). In this sense, to facilitate the data organization, a bibliographic manager was used (e.g., *Mendeley*).

Phase 5: Analysis of the document's quality. To assess the quality of the selected documents, a questionnaire developed by Law et al., (1998), and previously used in the scientific literature (Gamonales et al., 2021; Hernández-Beltrán et al., 2021) was used. Two different experts conducted the review, giving a score for each paper. The selected manuscripts were evaluated according to:

- *Purpose* (Q1).
- *Relevance of the background literature* (Q2).
- *Adequacy of the study design* (Q3).
- *Sample included* (Q4 and Q5).
- *Informed consent procedure* (Q6).
- *Outcome measures* (Q7 and Q8).
- *Description of the method* (Q9).
- *Importance of the results* (Q10).
- *Analysis* (Q11).
- *Practical importance* (Q12).
- *Description of dropouts* (Q13).
- *Conclusions* (Q14).
- *Practical implications* (Q15).
- *Limitations* (Q16).

All quality criteria were scored on a binary scale (Yes=1/No=0). Once the score was obtained, the documents were classified according to their methodological quality, being (Sarmento et al., 2018):

(A) *Excellent methodological quality* (score >75%).
(B) *Good methodological quality* (score between 51% and 75%).
(C) *Low methodological quality* (score <50%)

Statistical analysis

A descriptive analysis related to the following variables was conducted: *Year*, *Keywords*, *Database* and *Type of study* to obtain relevant information related to the selected documents. For this, the software used for the analysis was the *Statistical Package of Social Science software* (version 27, 2021; IBM Corp., IBM SPSS Statistics for MAC OS, Armonk, NY, USA).

RESULTS

Table 3 shows the documents selected for the systematic review related to the inclusion of students with AC in the ECE classroom based on the study variables.

Table 3. Selected documents related to the inclusion of students with AC in the classroom of ECE.

Id	*Author /s*	*Year*	*Title*	*Resume*	*Keywords*	*DB*	*AD*	*TD*	*TEA*	*EC*	*DM*	*P*	*IA*	*TIA*	*Q*
1	Pfeiffer et al.	2022	Functioning and well-being in older children and adolescents with achondroplasia: A qualitative study	The aim of this work is to know how achondroplasia influences children and adolescents in their daily lives.	Achondroplasia; teenagers; physical functioning; quality of life; school	WOS, Scopus, PM	Yes	JA	Emp. Q.	Yes	Yes	32	Yes	Location of objects in more accessible places due to short stature, difficulty sitting in conventional seats due to their great length. Encourage physical activity in this population, to improve general well-being and increase inclusion in society.	A
2	Make et al.	2013	Education and related support from medical specialists for Japanese patients with major skeletal dysplasias.	In this study, using questionnaires in patients with CA/ hypochondroplasia and osteogenesis imperfecta, aimed to clarify what types of schools they attend, what kind of support they need, and how medical advice is passed on to schools.	Achondroplasia Hypochondroplasia; osteogenesis imperfecta; Special needs education.	WOS Scopus	Yes	JA	Emp. Stu.	Yes	Yes	202	Yes	Walking without crutches or prostheses, stairs with low handrails, remodelling of classroom and bathroom furniture, personal assistant for motor activities and advice from specialist doctors.	B.
3	Make	2004	Management of disabilities associated with achondroplasia.	Document that collects the main characteristics of patients with CA, defending that their social maturity is equal to that of the rest, but not their maturity in terms of locomotion.	Achondroplasia; disabilities; Complications.	WOS Scopus P.M	Yes	JA	T	Yes	Do not	Do not	Yes	It does not mention any type of activity.	A

4	Gollust et al.	2003	Living with achondroplasia in an average-sized world: An assessment of quality of life.	In the study, the vital challenge that AC patients have is analysed: medical, social, and physical difficulties. Also, he proposed future research that relates self-esteem and quality of life, as well as looking for effective interventions.	Short stature; Quality of life; Achondroplasia; self-esteem; Illness perception; Social functioning.	WOS Scopus	Yes	JA	Emp. Q	Do not	Yes	325	Yes	Equitable access to public facilities, employment and education.	B.
5	Castiglia	1996	Achondroplasia	The article showed the physical characteristics of patients with AC, the motor possibilities that promote their development and the habits to work from the family for their correct socialization.	Achondroplasia; Short stature; Quality of life.	WOS, Scopus, PM	Yes	JA	T	Do not	Do not	Do not	Yes	Adaptations in the physical environment of the home (switches, stools, toilets, etc.), and of the school (doors), adaptations in tricycles, bicycles or cars and supervised swimming.	B.
6	Shakespeare	1988	Social implications of achondroplasia-A public health view.	In this document, the possible reactions of the parents of patients with AC are shown. Also, some premises were given in terms of education, socialization, and motor aspects.	Achondroplasia; Short stature; Quality of life.	WOS, Scopus	Yes	JA	T	Do not	Do not	Do not	Yes	Ordinary education and schooling, search for job opportunities and non-contact sports activities.	B.

7	Veter 1988	Social implications of achondroplasia-A public health review.	This article explains the origin of AC, the importance of a good diagnosis, the methods to treat it and the guidelines for the correct socialization of patients.	Achondroplasia; Short stature; Quality of life.	WOS, Scopus, PM	Yes	JA	T	Do not	Do not	Do not	Yes	Physiotherapy and adapted exercise plan.	C

Id: Identifier; DB: Database; AD: Document Accessibility; TD: Type of Documents; ST: Type of study; EC: University Ethics Committee; SD: S ample Description; P: Participants; IA: Inclusion of students with AC; TIA: Type of inclusive activities; Q: Document quality; WOS: Web of Science; PM: Pubmed; JA: Journal article; Emp. Stu.: Empirical studies with quantitative methodology; T: theoretical study; Emp. Q.: Empirical studies with qualitative methodology.

Figure 3 shows the characterization of the selected documents according to the Year of publication of each scientific document, to facilitate understanding and reading. Being, the year 1988 (*n* = 2), the year with the highest number of publications related to the object of study.

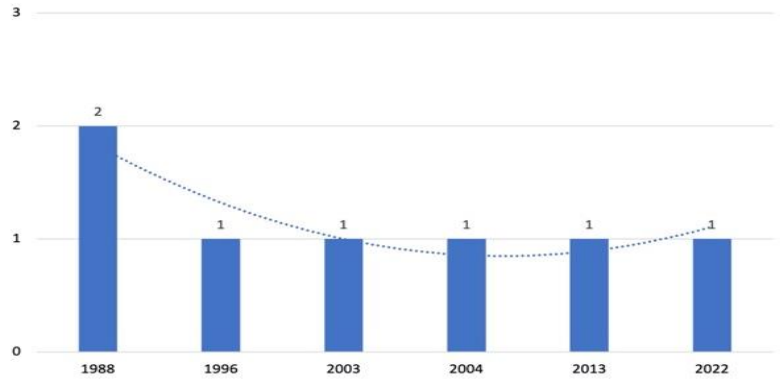

Figure 3. Characterization of the documents according to the Year of publication.

Figure 4 shows the characterization of the selected documents based on the *Keywords* of each manuscript. Shown as "*Achondroplasia*" (*n* =7), "*Quality of life*" (*n* = 5), and "*Short stature*" (*n* = *4*) the most used terms.

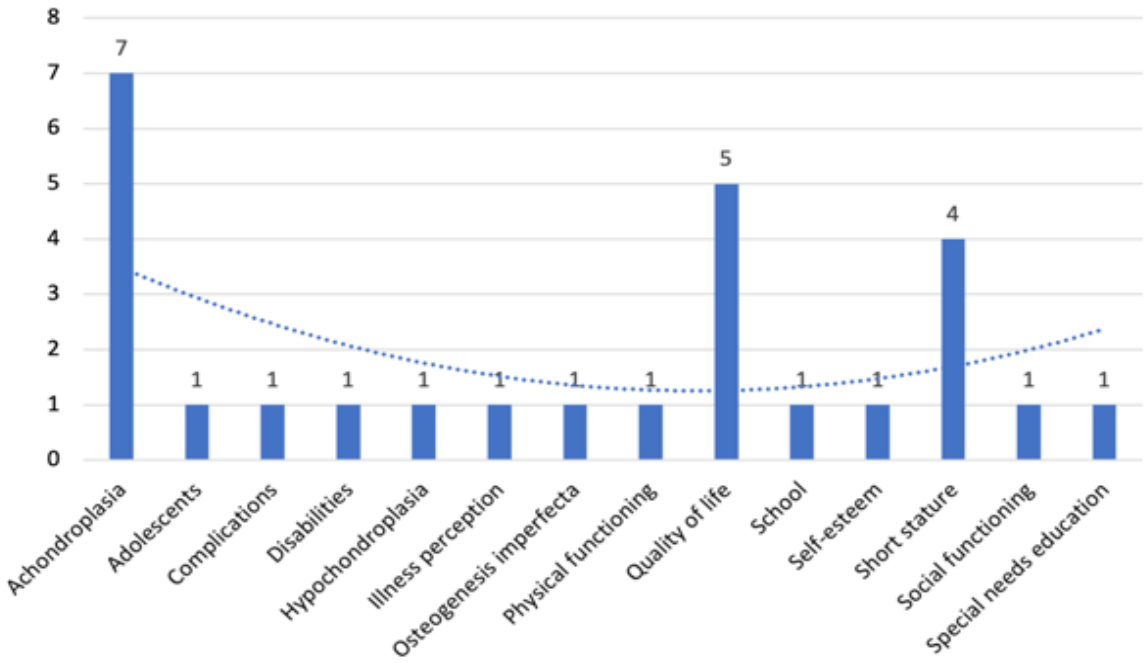

Figure 4. Characterization of the documents based on the keywords.

Figure 5 shows the number of documents selected based on the *Database.* All the selected manuscripts are written in *English* and, mainly, in the *WOS* (*n* = 7) and *Scopus* (*n = 7)* data platform. The number of documents that appear in the figure is higher than that used in the systematic review, because of the existence of repeated manuscripts on different platforms.

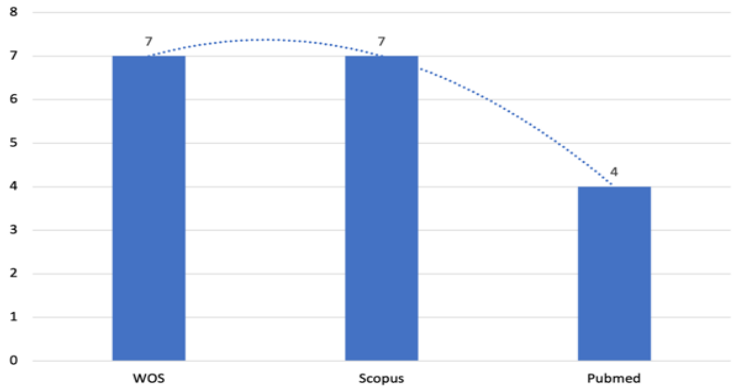

Figure 5. Characterization of the documents based on the Database.

Figure 6 shows the *Type of study* developed by the author(s) of the selected documents. Being, Theoretical Studies (*n* = 4), the most predominant *Type of study.*

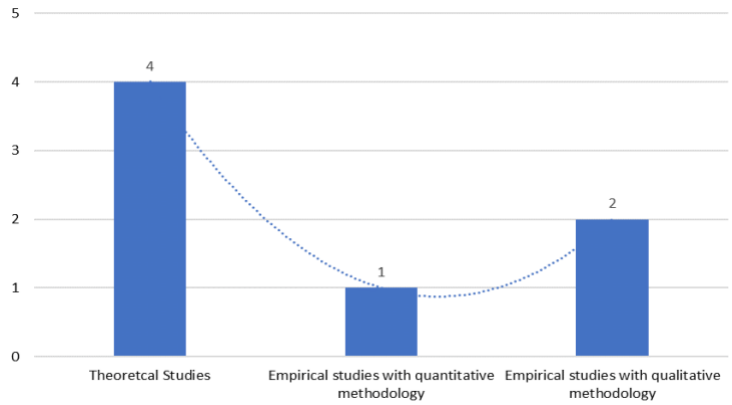

Figure 6. Characterization of the documents according to the Type of study.

Finally, Table 4 shows the different scores given to each of the documents selected by external observers, taking as a reference the quality questionnaire prepared by Law et al. (1998). Once the different scores were obtained, the average of the scores was made to obtain the methodological quality of each of the documents (Sarmento et al., 2018).

Table 4. Quality analysis of the documents related to the inclusion of students with AC in the classroom of ECE

Id	*Observer 1*	*Observer 2*	*Average*	*Quality*
1	87.5	87.5	87.5	A
2	75	75	75	B
3	81.3	81.3	81.3	A
4	75	75	75	B
5	68.8	68.8	68.8	B
6	62.5	56.3	59.4	B
7	43.8	37.5	40.6	C

DISCUSSION

This systematic review aimed to present work aims to comprehensively summarise the available literature related to the procedure used to include students with achondroplasia in the Early Childhood Education system. This information could serve as the initial proposal procedures to develop a real inclusion and redirect future initiatives. As the main feature of the search, it is worth highlighting the scarcity of manuscripts (*n* = 7), which reveals the lack of published knowledge and research on this subject.

In relation to *Keywords*, it is observed that the most used words are "*Achondroplasia*" (*n* =7), "Quality *of life*"

(*n*=5) and "*Short stature*" (*n*=4). In the scientific literature, there are no studies that corroborate these results, and the studies did not specify how and why the keywords were selected. However, these three terms were the most frequently used in the studies, confirming that the key features of subjects with achondroplasia are described in the different manuscripts. However, the statistical analysis has served as support for researchers when selecting the *Keywords* in this work (Gamonales, Muñoz-Jiménez et al., 2018). Nevertheless, good planning and selection of the key terms is fundamental when it comes to obtaining successful results in the studies (Benito-Peinado et al., 2007).

According to the *Year of publication,* the documents of the authors Shakespeare (1988), and Vetere, (1988), are the first manuscripts related to the subject under study. Furthermore, the study conducted by Haga et al., (2013), and Pfeiffer et al., (2022), are the only documents published in the last 10 years that meet the *inclusion and exclusion criteria* established. Therefore, it is an incipient field as a result of the lack of sample, since an incidence of between 1 in 30,000 births is estimated (Horton et al., 2007; Ireland et al., 2014). Therefore, the sample has a significant impact on the reliability of the studies.

Regarding the documents selected for the systematic review, documents have been in the following databases: *WOS* (*n*=7) and *Scopus* (n=7), as well as in *Pubmed* (*n*=4). There are many existing databases*,* however, not all of them have the necessary manuscripts to conduct a correct investigation and reflection, limiting the researchers access to the signs and developmental milestones of people with AC. For this reason, theoretical background alone is not enough to seek solutions for this minority group in our society. Therefore, it is important to search for documents in those databases in which there is a larger number of specialized studies. Due to this, researchers in the field of *Education* and *Disability are recommended to* conduct publications in indexed journals, to give visibility to studies related to the field of education and inclusion in the classroom. In addition, writing the documents in English, since it facilitates collaborations and research, as well as having a greater probability of publishing in a journal with a high impact factor, which allows the authors to achieve a greater impact of their work at an international level (Gamonales et al., 2021).

Regarding the *Bioethics Committee of* the studies, it should be noted that the

studies conducted by Pfeiffer et al., (2022), Haga et al., (2013), and Haga (2004), are the only works presented with committee approved by the University of the authors. This ethic is understood as the rules that govern scientific publication; rules that must be met in all original works that conduct a study with human beings (Dorta, 2013). For this reason, it is recommended that future research should present said Code of Ethics, since all studies that carry out experiments with human beings must be previously approved by the Ethics Committee of the University.

In relation to the *Type of study* that has been conducted in the selected documents, the predominant category is *Theoretical Studies* (*n* = 4). According to Montero & León (2007), *Theoretical Studies are* those manuscripts in which the authors do not show their own collected data but conduct research using data already published by previous authors, among which this work is framed. The rest of the works are framed within the *Empirical Studies with Quantitative Methodology* (*n* =1). Being the manuscript of Haga et al., (2013), the only one that analyses the quality of information transmitted to doctors through a questionnaire, as well as proposing a battery of inclusive activities to be developed in the classrooms. On the other hand, Gollust et al., (2003), developed an *Empirical Study with a Quantitative Methodology*, since they collect the difficulties presented by subjects with AC when conducting daily activities, through individual interviews. In addition, the work of Pfeiffer et al., (2022), is an *Empirical Study with Quantitative Methodology,* where they seek to know how BA influences children and adolescents in their daily life. Therefore, it is important to highlight that the number of studies related to the experimental methodology in the subject is small, which is why the tools to improve the inclusion of students with AC in the ECE classroom are unknown. Therefore, it is recommended to conduct studies with experimental methodology that do not focus solely on the theoretical component of disability, but more on the intervention with subjects with CA and on the evaluation of their possibilities of action and development. Also, the seven valid documents for conducting the systematic review have a common *Document Type,* all *of them being Journal Article*. This *Type of document* is seen by experts as having greater value and validity than the others, such as *Books* or Book *Chapters.* However, it is recommended to increase the number of scientific

contributions in relation to people with AC in the ECE. stage, through the publication of: *Doctoral Thesis, Books*, *Book Chapters*, *Academics Projects, Congress Publication, Journal article, Patent document* (Gamonales, Muñoz-Jiménez et al., 2018).

Based on the *inclusion of students with AC,* the answer was affirmative and unanimous in all documents (n = 7). The experts recommend the inclusion of the student with AC in the ordinary classroom, although integration is not mentioned. These two concepts differ from each other and today inclusion is not truly valued, being the social integration of people in their peer group and in society more valued. For this reason, inclusion must be the prior step to the total integration of students with AC in the ECE classroom and in daily life participation in general. To achieve the full inclusion of students, there must be collaborative work between members of the educational community, doctors, families, and students to improve their quality of life and the care received by the different professionals (Haga et al., 2013). Therefore, inclusive methodological strategies must advocate for equal opportunities for students with disability to develop the necessary skills and attitudes to learn (Gamonales, 2016).

Regarding the *Type of inclusive activities,* there are several common aspects to most of the selected manuscripts. On the one hand, experts recommend renovating and adapting all types of furniture for students with AC to be accessible (Castiglia, 1996), and adapted to the short stature of students (Pfeiffer et al., 2022). On the other hand, they mention the importance of introducing low handrails on the stairs, as well as providing a personal assistant for the student with AC when conducting motor activities (Haga et al., 2013). Finally, Gollust et al. (2003) propose to carry out a modification to allow equitable access to public facilities. Also, inclusion in ordinary school and equal employment opportunities are aspects to highlight (Shakespeare, 1988). In addition, activities such as unsupported walking and adapted sports and exercise plans are essential (Haga et al., 2013; Vetere, 1988). Therefore, it is essential to encourage physical activity in this group (Pfeiffer et al., 2022). However, Haga (2004) does not mention any type of inclusive activity. Consequently, it suggests that this group is not as visible as it should be. For this reason, it is recommended to increase the number of investigations related to people with AC in the ECE classroom. In addition,

the evidence shown above reflects the need to include students with AC in the ordinary ECE classroom and make them responsible for their own development with the help of the corresponding professionals.

Finally, in relation to the *Quality of the documents,* four of the studies selected for the systematic review have a *Good methodological quality* (Sarmento et al., 2018). On the other hand, the Vetere manuscript (1988) is the only one that presents a *low methodological quality* due to its time. On the contrary, the *journal article* by Haga (2004) and (Pfeiffer et al., 2022) are the documents that present an *excellent methodological quality.* Therefore, for future research, it is recommended to consider the questionnaire prepared by Law et al., (1998), and expand it when preparing the document to guarantee the quality of the studies. In addition, it is recommended to increase the number of experts, to maximize the reliability of the scores, and reduce the bias between the different documents. On the other hand, it would be advisable to design and validate a new document quality questionnaire for future systematic reviews.

CONCLUSIONS

This document is one of the first works related to the inclusion opportunities and analysis of students with AC, and the knowledge of the *type of inclusive activities* that should be developed in the ECE classroom. However, there are few documents that investigate about the different possibilities of action to develop an inclusive methodology in the students with AC. In addition, the selected manuscripts are written in *English* and are *Theoretical Studies* found mainly on the *Scopus platform.* For this reason, it is recommended to carry out new research in which the different possibilities of action in the classroom are collected when attending to students with AC.

Limitations

One of the main limitations of this systematic review is the lack of documents related to the *Types of inclusive activities* for students with AC in the ECE stage, being essential the work of professionals in early care in said students to avoid the delay in the acquisition of physical capacities or abilities.

Acknowledgments and funding

This work has been partially subsidized by the Aid to Research Groups (GR21149) of the Junta de Extremadura (Ministry of

Employment and Infrastructures); with the contribution of the European Union through the European Regional Development Funds (FEDER). In addition, the author José M. Gamonales is a beneficiary of an Aid from the Requalification Program of the Spanish University System, Field of Knowledge: Biomedical (Aid Ref.: MS-18).

Conflict of interests

Authors reported no conflict of interests.

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