LANGUAGE DEVELOPMENT AND HEARING IMPAIRMENT: LITERATURE REVIEW

Desenvolvimento da linguagem e deficiência auditiva: revisão de literatura

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ABSTRACT

The purpose of this study is to review the scientific production about the relationship between language performance and hearing impairment, as well as analyze the observational studies on the subject. It is a literature review, in which we used the descriptors "Hearing Loss", "Child Language", "Language", "Phonology" and "Vocabulary" in the databases of Portal Capes , Bireme, SciELO and Pubmed during the period of July-December 2012. Inclusion criteria were articles available in journals published between 2007-2012. Criterion for exclusion was not having as main focus the acquisition / development of language in children and / or adolescents with hearing impairment. The analytical observational studies were checked by means of 22 items related to information that should be present in the title, abstract, introduction, methodology, results and discussion, recommended by the initiative STROBE (Strengthening the Reporting of Observational Studies in Epidemiology). We found 26 articles, which were separated into themes being oral language, written language, and reading and literature review. It was found that many articles mention the benefits of shorter sensory deprivation as well as the longest speech therapy and increased use of Individual hearing aids or cochlear implant. The data analysis through the STROBE points out that most of the analyzed papers presented necessary information, especially the items title, abstract and introduction. The scientific works studied in the literature review revealed that there are no protocols with specific normal standards for individuals with hearing impairment.

KEYWORDS: Speech, Language and Hearing Sciences; Hearing Loss; Child Language; Child

INTRODUCTION

The hearing plays an essential role in acquisition and development of language. Thus, considering the communication field, the hearing loss can be held as an important biological factor causing significant delay in child development[1].

Thereby, it is important that there be an early diagnostic and language intervention, in order to bring the hearing development of these individuals to the normality. The language development in child with hearing impairment happens in a heterogeneous manner. However, it is necessary to improve the knowledge about the development process. There are a few standard protocols in Brazil for language assessment of child with hearing impairment, being often used standard protocols for hearing children.

The use of individual hearing aids has favored a greater exploitation of hearing, minimizing the impact of hearing impairment in the process of acquisition and development of language, and consequently, of the orality of child with hearing loss[2].

It is known that language is a social tool that is used in social interactions with the purpose of communication[3]. The difficulties in language are concern to alterations in the expression development and verbal reception and writing. Thus the necessity of early identification of these alterations in the normal development avoids subsequent educational and socials unfavorable effects[3].

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Conflict of interest: non-existent

The study of language development in child with hearing impairment using individual hearing aids assess the oral and writing skills, as well as its alterations. It has been used various protocols to assess these development, regarding vocabulary, phonology, pragmatic, speech recognition, auditory discrimination, among others. These assessments make it possible to know the performance of individuals with hearing impairment and compare them with the patterns of normality, providing an assessment of the effectiveness of the speech therapy intervention.

The purposes of this study were to systematically review the literature about the relationship between language development and hearing impairment and analyze the observational researches published about it with reference on the STROBE initiative.

METHODS

It is a systematically review of literature that had the following guide question: *How is it the acquisition and development of language in a person with hearing impairment?*

After the guide question definition, it was realized two stages for the construction of this review. In the first stage, it were realized the following steps: identification of the topic, definition of the keywords, literature search, categorization of the studies, assessment of the studies included in the review, interpretation of the results and synthesis of the knowledge highlighted in the analyzed articles, as proposed in literature[4,5].

It were performed searches in the databases LILACS and PubMed for access to indexed journals in MEDLINE, and search in the database SciELO about the subject of interest during the period of 2007 to 2012. The search was carried out in the period of July-December 2012. It were used the descriptors in health science created by bireme: “hearing”, “Child Language”, “hearing loss”, “Language”, “Phonology” and “Vocabulary” in Portuguese, English and Spanish.

The inclusion criteria were: researches realized with children and / or adolescents with hearing impairment or that has the main focus in the language development of these population; articles in English, Spanish or Portuguese; complete original articles.

The exclusion criteria were: not has as main focus the language development of children and/ or adolescents with hearing impairment; opinion articles, letter to the editor and dissertation and thesis.

The initial search appointed 4.069 articles, which 355 were selected for analysis following the inclusion criteria. After reading the title and abstract, 33 articles remained and were read in their entirely. In the first stage (application of the first evidence matrix), 26 articles were selected.

In the second stage, it were applied the second evidence matrix (inclusion of observational articles for methodological analysis, 22 observational and analytical studies were included; it were excluded two cases reports, one analytical and experimental study and one literature review.

The data analysis was realized in two stages. The selects articles in the first evidence matrix were critically analyzed in the following thematic bases oral language, writing and reading language and literature review.

In order to optimize the study of the selected articles after the stages above, it was chosen to analyze the observational articles according to STROBE initiative (Strengthening the Reporting of Observational Studies in Epidemiology)[5]. This methodology is made by 22 items related to the information that should be present in the title and abstract, introduction, methods, results and discussion. The STROBE initiative was developed by researchers in epidemiology, statistics, scientific methodology and editors of scientific journal and the main purpose of it is to disseminate the principle that should guide the description of observational studies.

The data collected in the articles analysis by means of STROBE initiative were stored in electronic formats and it was used for data processing and analysis Epi Info 7.1.0.6. It was realized the descriptive analysis of the frequency distribution of the variables and the Fisher Exact Test was used in order to investigate the associations. The significance level adopted was 5%.

LITERATURE REVIEW

In the present review, 26 articles were found[2,6-30], being eighteen analytical observational transversal studies[2,6-9,12-14,17-21,23,24,27-29], four analytical observational longitudinal studies[10,11,16,22], two reported case[15,25], one experimental study[26] and one literature review[30], consisting of nineteen national and seven international researches. The articles were separated in thematic bases and distributed in frames to results presentation.

In Figure 1, the methodology and the main conclusions of the articles that had as focus the oral language are presented. In Figure 2, it was discussed the methodology and main conclusion of the articles that studied the elements of writing and reading language.

STUDY	DESIGN OF THE STUDY	METHODOLOGY	MAIN RESULTS
Zanichelli L, 2010	Analytical observational transversal	Subjects: 30 children aged between three and 10 years. 15 with normal hearing in Control Group (CG) and 15 with hearing impairment in Study Group (SG). Instruments: audiometry, imittance, Phonology Tasks of ABFW – *Teste de Linguagem Infantil* and interview. Analysis: Analysis of PCC, comparision between CG and SG. Statistical Analysis: SAS program version 8.2; Analysis of Variance (ANOVA)	CG presented a better performance in all tasks comparing to SC. The PCC indexes presented by the children with hearing impairment characterized a moderately severe phonological disorder. Children enrolled in therapy for a longer period had better PCC indexes and the longer they had been using hearing aids, the better their performances on the imitation task.
Ferreira MIO, 2012	Analytical observational transversal	Subjects: 64 children aged between 5 to 8 years. 32 in Control Group (CG) and 32 in Study Group (SG). Instruments: Vocabulary Taks of ABFW – *Teste de Linguage Infantil* and interview. Analysis: comparision between CG and SG. Statistical Analysis: Qui-Square test and Kruskal Wallis test.	In most of the conceptual fields, the hearing loss group obtained worse performance in relation to the control group. It was verified that in both studied groups, the worst performance happened in the categories: places, food and clothes, in all ages.
Angelo TCS, 2010	Analytical observational transversal	Subjects: 57 individuals with hearing loss aged between 9 to 18 years. Instruments: lists of monosyllabic and disyllabic word recognition, lists of meaningless syllables recognition – Consonant Confusion Study – Confuse Program, lists of sentence recognition and list of words. Analysis: analysis of the performance of hearing in speech perception. Statistical Analysis: model one-way analysis of variance and Turkey`s correction.	The best results were obtained on the test of recognition of word and phonemes. Regarding to the age at the time of the evaluation, it was observed that the older subjects and with the longest hearing sensorial deprivation presented the lower performance in the tests of speech perception.
Moret ALM, 2007	Analytical observational transversal	Subjects: 60 children users of cochlear implant aged between 2:6 to10:8 years. Instruments: medical evaluation of hearing behavior; TACAM: Assessment Test for Minimum Hearing Capacity; IT-MAIS – Infant Toddler: Meaningful Auditory Integration Scale; Procedure for the Assessment of Profound Hearing Impairment Children; List of everyday sentences of the Portuguese language; and List of words as procedure for assessment of speech sound perception. Analysis: hearing and oral language performance. Statistical Analysis: Chi-square test and multi-varied analysis applied for the ordinal categorical.	37 out of 60 children presented progress in oral language, which is represented by the gain in language categories 3,4 and 5, while 23 children remained in category 1 or achieved category 2, which represents a more limited progress. It is important to highlight that most of the children in language categories 1 or 2 represented mostly the youngest and the ones with less time of cochlear implant use.
Stuchi RF, 2007	Analytical observational transversal	Subjects: 19 children users of cochlear implant. Instruments: *Reynell Developmental Language Scales*(RDLS) adapted to the Brazilian Portuguese Analysis: analysis of the profile of the oral language. Statistical Analysis: Spearman correlation coefficient.	The language profile of children who use CI for five years is similar to five years old hearing children regarding Expression and to that of four years old hearing regarding Comprehension. The time of sensorial privation was statistically significant for the overall score of RDLS.
Fernandes DMZ, 2011	Analytical observational longitudinal	Subjects: infants born between August 2007 and July 2008, who remained hospitalized at least 48 hours, and showed normal results in the Automated Auditory Brainsterm Evoked Potential Test (PEATE) at birth, but presented one or more risk factors for hearing loss. Instruments: *Early Language Milestone Scale* (ELM) Scale, audiological tests (instrumental and visual reinforcement audiometry evaluation) and immitanciometry. Analysis: Qui-Square test, McNemar test, Fisher Exact Test.	In the Early Language Milestone Scale, nine infants showed alterations at four months and 11 at eight months of age. At 12 months, 18 (20,6%) infants showed alterations, and five of these had showed delays in the previous evaluations. Statistical analysis demonstrated that altered results ate four and eight months can predict difficulties in the infant`s responses at 12 months. There were transitory alterations in oral language development.
Queiroz CAUF, 2010	Analytical observational longitudinal	Subjects: nine deaf children using cochlear implant. Instruments: Reynell Developmental Language Scales (RDLS) Verbal Comprehension adapted to the Brazilian Portuguese. Analysis: longitudinal analysis of verbal comprehension. Statistical Analysis: exploratory analysis of the data and linear regression model, with Bayesian approach.	The implated children achieved a statistically significant progress in relation to the verbal comprehension over time.

STUDY	DESIGN OF THE STUDY	METHODOLOGY	MAIN RESULTS
Curti L, 2009	Analytical observational transversal	Subjects: 32 children aged between two and six years (16 hearing impaired with moderarely severe to profound hearing loss and 16 children with normal hearing with no Speech-Language Pathology Complaints or history of speech therapy. Instruments: Pragmatic tasks of *Teste de Linguagem Infantil* - ABFW Analysis: comparison between cases and controls. Statistical Analysis: SPSS version 11.5 and EpiInfo version 3.5.1	The hearing impaired children presented fewer communicative initiatives than normal listeners.
Fortunato CAU, 2009	Analytical observational transversal	Subjects: 12 children without hearing impairment aged between 4 years and 2 months and 4 years and 11 months (control group) 10 children with sensorineural hearing loss users of cochlear implant aged between 4 years and 3 months and 5 years and 0 months. Instruments Verbal Expression Scale of Reynell Development Language Scales (RDLS). Analysis: Comparision of the verbal expression of listerners children and children users of cochlear implant. Statistical Analysis: the found results were qualitatively analyzed.	The deaf children had a worse performance when compared to the children without hearing impairment in relation to verbal expression. Three deaf children (with longer time using the cochlear implant and shorter time of hearing sense deprivation) had results close to the considered as standard for the research.
Lichtig I, 2008	Analytical observational transversal	Subjects: 30 deaf children divided into two groups: Pre-Linguistic Group (PLG) and LInguistic Group (LG), after underwent a language evaluation and aged between 41 and 59 months. Instruments: analysis of the record of the communicative abilities during interaction with the examiner and Communicative Abilities Pragmatic Profile. Analysis: comparison of communicative abilities between children in pre-linguistic phase and linguistic phase. Analysis: Chi-Square test, and descriptive analysis of the data.	Both groups basically presented the same communicative abilities; however the linguistic group presented higher frequency of occurrence, especially in the abilities regarding communicative intentions and responses for communication.
Bastos FN, 2009	Case Report	Subjets: Male child, seven years, with sensorineural hearing loss, moderately severe to profound degree and user of hearing aid. Instruments: adapted interview from the model of anamnesis and observation of four sessions of speech therapy. Analysis: analysis of the hearing skills.	It was verified delay in the hearing development, since the individual present only detection, discrimination and identification. The late diagnosis is directly related to the delay in the hearing development and directly affects the oral language development.
Sousa AN, 2012	Analytical observational longitudinal	Subjects: two bilingual hearing individuals: Igor, a child with deaf father and hearing mother, whose date are analyzed for the period in which he had between 2 and 4 years old; Lu, an adult, daughter of deaf parents, 30 years old. Instruments: nine sessions of verbal interaction, in LIBRAS and portuguese, videotaped. Analysis: Qualitative analysis	The adult seems to use the code-switching more concerned about the interaction, while the child does not seem to have used it with specific pragmatic purposes. Both used statements higher than a single word.
Quadros RM, 2012	Analytical observational transversal	Subjects: Five children of deaf parents (Children of Deaf Adults – CODAS), five children using cochlear implant (CI), three deaf children and three adults CODAS (control group). Instruments: Portuguese Pseudowords and Libras Pseudosigns. Analysis: comparing the performance of bimodal bilingual hearing children and deaf children with cochlear implant.	The bimodal bilingual hearing children had higher scores in both tests. The performance of the deaf children with cochlear implant was similar to the group of bimodal bilingual hearing children. The deaf children users of cochlear implant with restricted access to Libras had lower scores in the tests.
Geers AE, 2011	Analytical observational transversal	Subjects: 112 users of cochlear implant, 53 boys e 59 girls, age ranged from 8,0 and 9,11 years for the firs language evaluation and between 15 and 18,6 years for the second evaluation, with mean hearing thresholds of 30dB. . Instruments tonal audiometry, Wechsler Intelligence Scale for Children Verbal Scale (WISC-V), Clinical Evaluation of Language Fundamentals- (CELF-4), Peabody Picture Vocabulary Test (PPVT) e Expressive One-Word Picture Vocabulary Test (EOWPVT)	The adolescents that used for more than 10 years the cochlear implant have a optimistic view about the benefits of early use, since 71% of them had scores within or above the normal range in the WISC-V.

STUDY	DESIGN OF THE STUDY	METHODOLOGY	MAIN RESULTS
Fagan MK, 2010	Analytical observational transversal	Subjects: 23 children with hearing loss (15 male and eight female) between six and 14 years old; who underwent cochlear implant between 1,4 and 6,0 years. Instruments: interview with parents, Peabody Picture Vocabulary Test (PPVT-III)	There was evidence of vocabulary understanding across all PPVT-III content categories with no evidences of disproportionate numbers of errors in any specific content area. Mean standard scores were below the test mean established for hearing children when based on the age that the CI was realized, and they were within the average range for hearing children when calculated based on the time of cochlear implant use.
Edwards L, 2010	Analytical observational transversal	Subjects: 69 children aged between eight to 12 years, being 22 deaf children users of Cochlear Implant, 25 deaf children users of hearing aid and 25 hearing children. Instruments: Verbal and Spatial Reasoning test for Children (VESPARCH); The Test for Reception of Grammar -Version 2 (TROG-2); The British Picture Vocabulary Scale (BPVS) Analysis: comparison between groups	The deaf children present a lower perfomance in relation to the hearing children. No significant difference was found between the children users of hearing aid and children using cochlear implant.
Most T, 2010	Analytical observational transversal	Subjects: 37 children with hearing impairment, aged between 6:3 to 9:4, 13 using hearing aid, 11 using cochlear implant and 13 listeners. Instruments: MAASE linguistic Test, Pragmatic Protocol of C. A. Prutting& D. M. Kirchner Analysis: comparison between groups.	The children with hearing loss presented more incidents of inappropriate use of pragmatic abilities.
Niparko JK, 2010	Analytical observational longitudinal	Subjects: 285 children, being 188 diagnosed with profound sensorineural hearing loss that underwent to cochlear implant until five years old and 97 hearing children Instruments: Reynell Developmental Language Scales (RDLS) Analysis: comparision between groups Statistical Analysis: SAS (SAS Institute, Cary, North Carolina)	Children undergoing cochlear implant showed greater improvement in spoken language per year in comprehension than would be predicted by their preimplantation baseline scores. Younger age at cochlear implantation was associated with steeper rates in comprehension and expression.
Sarant JZ, 2008	Analytical observational transversal	Subjects: 57 children with hearing impairment users of hearing aid or cochlear implant, aged between one and six years. Instruments: Child Development Inventory (CDI), Clinical Evaluation of Language Fundamentals Preschool (CELF-Preschool), Peabody Picture Vocabulary Test (PPVT-III) and The Moeller's Family Rating Scale Analysis: analysis of speech development and family participation.	No significant diferrences were found in the results of idioms for children with early diagnois and the others. The family participation, degree of hearing loss and cognitive ability significantly predicted language outcomes and together accounted for almost 60% of the variance in scores.
Houston DM, Miyamoto RT. 2010	Analytical observactonal transversal	Subjects: 15 children whose the cochlear implant was turned on between seven and 23 months of life, divided in two groups implanted between seven and 13 months and implanted 16 and 23 months. . Instruments: Grammatical Analysis of Elicited Language- Pre-Sentence Level (GAEL-P), Pediatric Speech Intelligibility Test (PSI), Lexical Neighborhood Test (LNT), Peabody Picture Vocabulary Test (PPVT) Analysis: comparison between groups.	The children early implanted had better vocabulary outcomes than children implanted tardily.

Figure 1 – Synthesis of the studies concerning the researches in oral language of the individual with hearing impairment

STUDY	DESIGN OF THE STUDY	METHODOLOGY	MAIN RESULTS
Guarinello AC, 2007	Case Report	Subject: deaf subject, 11 years old, caregiver of profound bilateral deafness diagnosed at 2 years old and user of Brazilian Sign Language (LIBRAS). Instruments: writing productions of the deaf subject made during individual therapy. Analysis: longitudinal description of the writing.	The missing elements in his texts, as prepositions, articles, conjunctions and some verbs, are, in majority, the ones that does not exist or manifest in another way in the sign language, his first language.
Cárnio MS, 2009	Analytical experimental	Subjects: Five student with profound bilateral sensorineural hearing loss and whose preferential modality of communication was LIBRAS, aged between 10 to 15 years. Instruments: Assesment Protocol of a Therapeutic Program of Instrumental Skills of Reading and Reading Strategies Protocol. Analysis: analysis of the scaffolding technique Statistical Analysis: Wilcoxon test and Spearman correlation.	At the end of the intervention program, more deaf students used elaboration strategies and fewer students used monitoring strategies.
Lemes JP, 2008	Analytical observational transversal	Subjects: four children who have acquired hearing loss in the pre-lingual period and underwent cochlear implant. Instruments: Orthographic Observation Script Analysis: analysis of the orthographic errors.	The categories with the highest incidence of orthographic errors were: voiced x unvoiced phonemes, multiples representations, “others” and omission of letters. The highest incidence of errors was related to acoustic and articulatory patterns; metalinguistic skills of phonological, lexical and morphosyntactic awareness and other aspects linked to language and pronunciation.
Crato AN, 2009	Analytical observational transversal	Subjects: 22 deaf subjects, with pre-linguistic bilateral severe to profund sensorineural hearing loss; children of hearing parents; aged between 14 to 24 years; enrolled in public schools, in regular classes and using LIBRAS as main mean of communication. Instruments: phoaudiological evaluation of the writing and questionnaire about the linguistic and school performance. Analysis: analysis of the writing production of the deaf individuals. Statistical Analysis: ANOVA test and Qui-Square test.	The subjects presented difficulty in tense inflection, using predominantly the verb in the nominal form of the infinitive.
SchemberGS, 2009	Analytical observational transversal	Subjects: 12 teachers from regular school and 12 parents, centering on deaf students. Instruments: Interview with the parents and questionnaire applied to the teachers. Analysis: analysis of the practices of reading and writing in the school.	The reading and writing practices are still conducted using textbooks, revealing a lack of diversity in the kinds of written material in the classroom.

Figure 2 – Sinthesys of the studies concerning the researchs in writing and reading language of the individual with hearing impairment

The 20 articles that approached oral language[2,6-24] referred to children with diagnosis of hearing loss, but differed on the protocols used to assessment. It is important to highlight that 4 studies of them assessed the communicative abilities[12,14,16,21] , by means of pragmatic protocols (Pragmatic Tasks of ABFW - *Teste de Linguagem Infantil*, Communicative Abilities Pragmatic Profiles e MAASE linguistic test) or verbal interactions; others four described the language expression and understanding[9,11,13,22] using the Reynell Development Language Scales (RDLS) and there were others four articles that have analyzed the vocabulary[7,18,20,24] by means of different protocols (Vocabulary Tasks of ABFW - *Teste de Linguagem Infantil*, Peabody Picture Vocabulary Test - PPVT e British Picture Vocabulary Scale -BPVS).

Therefore, it is concluded that in the literature there is no description of one specific and register evaluation for person with hearing impairment. One of the factors that can collaborate to the diversity of protocols used in the language assessment is the age of the children, as many assessment tools restrict their applications to a certain age limit. In turn, the variability of language development of children with hearing impairment can be influenced by a many factors, such as degree of the hearing loss, speech therapy intervention and use of electronic device.

In considering the 26 articles, only five reported specific studies on language field with emphasis on reading and writing[25-29] and the assessment protocols and the analysis of the writing productions were varied. Two articles[25,28] were concerning on analysis of the writing production of deaf individuals and user of Brazilian Sign Language (LIBRAS). Another study[26] described an experimental analysis by means of assessment and intervention performed in a group of individuals with hearing impairment that had the Brazilian Sign Language (LIBRAS) as preferred language. Another study[27] also approached a survey performed with person with hearing impairment that was submitted to Cochlear Implant, noting the categories that showed orthographic mistakes.

The last article[29] presented a research performed with parents and teachers of a regular school that aims to analyze and discuss the literacy practices in children with hearing impairment. The survey was developed by means of interviews with the parents, open and closed questions, about their vision in relation to school education and literacy of their child, and questionnaire to the teachers about school education in the context of inclusion and the process of reading and writing. This research concluded that the practices of reading are restrict in the familiar environment, while in the school the textbook is used during the reading and writing, and there is no diversification. It is important to highlight that few studies[25,26,28] discuss the influence of the language used by the individual with hearing impairment, whether it is LIBRAS or oral language, in their writing productions.

In the search conducted, it was find a systematic review[30] with 15 articles related to the long-term use of Cochlear Implant, with the purpose of verifying the effectiveness of the electronic device in developing the communicative abilities in individuals who have grown up using it, revealing the efficacy of it for adequacy the levels of language competence.

It is important to highlight that despite of the variety of test performed in the survey, there are no protocols with reference standards specifics for individuals with hearing impairment, in order to analyze the language development of child in your hearing condition. Therefore, it is necessary the development of studies to provide the specific protocols for these individuals.

In Tables 1 to 4, it is presented the analysis of the observational articles according to STROBE initiative checking the association among the subtopics design of the study, variables, size of the study and statistical methods with the topics title and abstract, introduction, results and discussion.

Table 1 – Analysis of the association between the articles that described the study design and the others items of strobe initiative

Variables	Description of the study design			p Value
	Yes	No	Total	
	N(%)	N(%)	N(%)	
Title and Abstract				
Complete	5(100)	0(0)	5(22,7)	
Incomplete	5(29,4)	12(70,6)	17(77,3)	p= 0,022
Total	10(45,5)	12(54,5)	22(100)	
Introduction				
Complete	2(50)	2(50)	4(18,2)	
Incomplete	8(44,4)	10(55,6)	18(81,8))	p= 0,723
Total	10(45,5)	12(54,5)	22(100)	
Results				
Complete	8(40)	12(60)	20(90,9)	
Incomplete	2(100)	0(0)	2(9,1)	p=0,378
Total	10(45,5)	12(54,5)	22(100)	
Discussion				
Complete	2(20)	9(75)	11(50)	
Incomplete	8(80)	3(25)	11(50)	p=0,032
Total	10(45,5)	12(54,5)	22(100)	

Fisher Exact Test
Legend: N = number of subjects

Table 2 – Analysis of the association between the articles that described the variables of the study and others items of strobe initiative

Variables	Description of the variables			p Value
	Complete	Incomplete	Total	
	N(%)	N(%)	N(%)	
Title and Abstract				
Complete	3(60)	2(40)	5(22,7)	
Incomplete	13(81,3)	4(66,7)	17(77,3)	p=0,876
Total	16(72,7)	6(27,3)	22(100)	
Introduction				
Complete	4(100)	0(0)	4(18,2)	
Incomplete	12(66,7)	6(33,3)	18(81,8)	p=0,463
Total	16(72,7)	6(27,3)	22(100)	
Results				
Complete	16(80)	4(20)	20(90,9)	
Incomplete	0(0)	2(100)	2(9,1)	p=0,111
Total	16(72,7)	6(27,3)	22(100)	
Discussion				
Complete	10(90,1)	1(9,1)	11(50)	
Incomplete	6(54,4)	5(45,5)	11(50)	p=0,150
Total	16(72,7)	6(27,3)	22(100)	

Fisher Exact Test
Legend: N = number of subjects

Tabela 3 – Analysis of the association between the articles that described the sample size and others items of strobe initiative

Variables	Description of the sample size			p Value
	Complete	Incomplete	Total	
	N(%)	N(%)	N(%)	
Title and abstract				
Complete	2(40)	3(60)	5(22,7)	
Incomplete	12(70,6)	5(29,4)	17(77,3)	p= 0,470
Total	14(63,6)	8(36,4)	22(100)	
Introduction				
Complete	3(75)	1(25)	4(18,2)	
Incomplete	11(61,1)	7(38,9)	18(81,2)	p= 0,958
Total	14(63,6)	8(36,4)	22(100)	
Results				
Complete	14(70)	6(30)	20(90,1)	
Incomplete	0(0)	2(100)	2(9,1)	p= 0,233
Total	14(63,6)	8(36,4)	22(100)	
Discussion				
Complete	7(63,6)	4(36,4)	11(50)	
Incomplete	7(63,6)	4(36,4)	11(50)	p= 0,657
Total	14(63,6)	8(36,4)	22(100)	

Fisher Exact Test
Legend: N = number of subjects

Table 4 – Analysis of the association between the articles that described the statistical methods and others items of strobe initiative

Variables	Description of the statistical methods			p Value
	Complete	Incomplete	Total	
	N(%)	N(%)	N(%)	
Title and abstract				
Complete	5(100)	0(0)	5(22,7)	
Incomplete	11(64,7)	6(35,3)	17(77,3)	p= 0,323
Total	16(72,7)	6(27,3)	22(100)	
Introduction				
Complete	3(75)	1(25)	4(18,2)	
Incomplete	13(72,2)	5(27,8)	18(81,8)	p= 0,611
Total	16(72,7)	6(27,3)	22(100)	
Results				
Complete	16(80)	4(20)	20(90,9)	
Incomplete	0(0)	2(100)	2(9,1)	p= 0,111
Total	16(72,7)	6(27,3)	22(100)	
Discussion				
Complete	10(90,9)	1(9,1)	11(50)	
Incomplete	6(54,5)	5(45,5)	11(50)	p= 0,150
Total	16(72,7)	6(27,3)	22(100)	

Fisher Exact Test
Legend: N = number of subjects

The analysis through the Strobe initiative allows us to check the quality of the observational article. The first methodological analysis of the articles referred to the fact of the design of the study present the key elements. In this analysis, there was association between the variables title and abstract and discussion (Table 1). The analysis also showed that 17 articles presented title and abstract incomplete, and 12 of them did not describe completely the design of the study. Although the item result presents more accuracy, it was verify that there are a large number of incomplete designs. It is important highlight that the fussy detail of the study is essential for the reproducibility and understanding of it.

The sub-item variables, contained in the item methodology, it is related to the description of the elements that can confuse and/or modify the finds of the research. It was observed that the most of the study showed the entire description of the variables (Table 2). When comparing the result, it was notice that all researches that presented the full description of the variables, also presented the entire results. However, there is no statistically significant association among the variables and the title and abstract, introduction, results and discussion.

The item size of the study referred to the detail of the criteria and data of calculation the sample size. There was no association between the variable title and abstract and the variables results and discussion (Table 3). However, it is important to highlight that 14 of the 20 studies that had the full results, described the sample size completely. Nevertheless, it was verified that eight articles described the sample size incompletely, setting 36% of the studies approaches in this research. The sample size must be defined according to the aim of the study. The choice and describe of the method according to the literature[31] enable a qualitative and effectiveness planning of the study, allowing the investigation of researchers.

Noting the association between the articles that describe the statistical methods and the selected variables, it was observed that there was no statistically significant association. All studies that described the statistical methods also describe the results completely (Table 4). However, there were six articles that described the statistical method incompletely, being affected the analysis of the studied population. The use of appropriate methods and techniques enables to find truthful results, and when properly described, provides information for studies with similar methodology[32].

According to the literature[33], the scientific methodology specifies the appropriate path to the knowledge construction and cooperates to the reproducibility of the study, when adequately described. The STROBE initiative provides the list to verification of the items that should be present in the observation studies, contributing to the more accuracy of the researches and reproducibility of the studies. Furthermore, it also propitiates the critical analysis and the state-of-the-art of the production and knowledge.

CONCLUSION

The article analysis showed that language development is related to the development of auditory skills. Hearing impairment results in losses for language development and the greater is the degree of the hearing loss, the greater is the difficulty of speech perception and discrimination and language deficits.

The scientific documents analyzed also revealed a great variety of tests used on language assessment. However, it is observed that there are no protocols with patterns of normality specific to a person with hearing impairment, in order to analyze the language development of child in your hearing condition.

In relation to methodological analysis, it was observed that the majority of the articles presented the essentials information, especially in title and abstract and introduction.

RESUMO

Este estudo tem como objetivo revisar as produções científicas acerca das relações entre desempenho da linguagem e deficiência auditiva, assim como analisar os estudos observacionais sobre a temática. Trata-se de revisão de literatura, no qual foram utilizados os descritores "Hearing Loss", "Child Language", "Perda Auditiva", "Linguagem", "Fonologia" e "Vocabulário" nas bases de dados do Portal Capes, Bireme, Scielo e Pubmed no período de julho a dezembro de 2012. Os critérios de inclusão foram artigos disponíveis em periódicos publicados no período de 2007 a 2012. Foi critério de exclusão não ter como foco principal a aquisição/desenvolvimento da linguagem de crianças e/ou adolescentes portadores de deficiência auditiva. Os estudos analíticos observacionais foram verificados por meio de 22 itens relacionados a informações que deveriam estar presentes no título, resumo, introdução, metodologia, resultados e discussão, recomendados pela iniciativa STROBE (Strengthening the Reporting of Observational Studies in Epidemiology). Foram encontrados 26 artigos, que foram separados em eixos temáticos, sendo linguagem oral, linguagem escrita e leitura e revisão de literatura. Verificou-se que muitos artigos mencionam os benefícios do menor tempo de privação sensorial, bem como do maior tempo de terapia fonoaudiológica e maior uso do Aparelho de Amplificação Sonora Individual ou Implante Coclear). A análise dos dados por meio da iniciativa STROBE aponta que a maioria dos artigos analisados apresentou informações necessárias, principalmente nos itens título e resumo e introdução. As produções científicas estudadas revelam que ainda não há protocolos com padrões de normalidade específicos para indivíduos com deficiência auditiva.

DESCRITORES: Fonoaudiologia; Perda Auditiva; Linguagem Infantil; Criança

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