





Reading and writing performance in cochlear implant users: integrative review

Desempenho de leitura e escrita em usuários de implante coclear: revisão integrativa

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ABSTRACT

Purpose: To describe the reading and writing performance of cochlear implant users, through an integrative review. **Research strategy:** The search for studies took place on the platforms: SciELO, PubMed and Virtual Health Library, which includes the databases: MEDLINE and LILACS. The guiding question of this review was: how is the reading and writing performance of cochlear implant users? **Selection criteria:** Studies published in the last five years, available in Portuguese and English, which described the reading and writing performance of cochlear implant users. Two authors reviewed and selected data such as: year, type of research, country, sample, objective, age of cochlear implant and conclusions. **Results:** Eight articles were included. The age range varied between 5 and 18 years of age. Spain and Iran have published studies in this area more frequently. In total, 419 schoolchildren were evaluated, 238 of whom were cochlear implant users, with a control group of 181 children with normal hearing. Studies demonstrate cochlear implant users have delays during reading and writing development, even more when compared to people with normal hearing. **Conclusion:** Even with the use of the cochlear implant, reading and writing performance in schoolchildren is considerably worse compared to individuals with normal hearing. In addition, the reading and writing performance of the participants is below expectations for the age group and school year.

Keywords: Child; Education; Cochlear implantation; Reading; Hearing loss

RESUMO

Objetivos: Descrever o desempenho de leitura e da escrita em usuários de implante coclear por meio de uma revisão integrativa. **Estratégia de pesquisa:** A busca dos estudos ocorreu nas plataformas: SciELO, PubMed e Biblioteca Virtual em Saúde as quais abrangem as bases de dados: MEDLINE e LILACS. A questão norteadora desta revisão foi: como se apresenta o desempenho de leitura e da escrita em usuários de implante coclear? **Critérios de seleção:** Estudos publicados nos últimos cinco anos, disponíveis nos idiomas português e inglês, que descreveram o desempenho de leitura e escrita em usuários de implante coclear. Dois autores revisaram e extraíram os dados como: ano, tipo de pesquisa, país, amostra, objetivo, idade de implante coclear e conclusões. **Resultados:** Foram incluídos oito artigos. A faixa etária variou entre cinco e 18 anos de idade. Países como Espanha e Irã publicaram com mais frequência estudos nesta área. No total, foram avaliados 419 escolares, sendo que 238 eram usuários de implante coclear, que tinham como grupo controle 181 crianças com audição normal. Estudos demonstram que usuários com implante coclear possuem atrasos significativos durante o processo de desenvolvimento de leitura e de escrita, considerado ainda maior quando comparados com indivíduos de audição normal. **Conclusão:** Mesmo com o uso do implante coclear, o desempenho de leitura e de escrita em escolares pode ser considerado pior em comparação ao de indivíduos com audição normal. Além disso, o desempenho de leitura e de escrita dos participantes está aquém do esperado para faixa etária e ano escolar.

Palavras-chave: Criança; Educação; Implante coclear; Leitura; Perda auditiva

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INTRODUCTION

The cochlear implant (CI) is a biomedical device, surgically implanted in the cochlea of patients with profound/severe hearing loss that have not presented satisfactory results with the use of the hearing aid. This device has the purpose of performing the functions of the internal hair cells of the cochlea, electrically stimulating the remaining fibers of the auditory nerve⁽¹⁾. The first years of life are fundamental for the execution of the surgery in the CI. In this period happens the height of the maturation process in the central auditory system and the neuronal plasticity of the hearing channel, fundamental step for the development of hearing and language abilities⁽²⁾.

On the other hand, it is hard to predict how the pre-lingual individuals with CI use in the first three years of life organized the received auditory information and even when they developed language⁽³⁾. This being over the fact the hearing progress depends on many factors, such as pre-implant hearing quality, the cause of hearing loss, length of sensorial privation, the age in which the user received the CI, the type of approach of hearing and language rehabilitation and their organic capacity for neuroplasticity⁽⁴⁾.

Thus, the incomplete hearing input before the CI use can affect the language development of the individual, including the semantic-lexical and syntax/grammatical fields, phonoaudiologic and pragmatic levels. The levels of hearing discrimination and comprehension may also suffer influences, due to the numerous variables that interfere in the benefits of CI use⁽⁵⁾.

Since 1957, when was reported the experience of stimulus in the hearing nerve by means of introducing an electrode into the ear of a patient with severe hearing loss⁽⁶⁾, the number of children that receive the CI increases gradually⁽⁷⁾ and, consequently, the schools have received students who use the CI more often⁽⁸⁾. The learning conditions of the school curriculum presented to the students who use the CI have presented poor performance^(9,10).

Although the CI technology provides hearing experiences that improve the development of oral language, their users face similar difficulties and challenges, originating from a delay in the acquisition of oral and written language⁽¹¹⁾.

Studies report that CI users possess a lower reading and writing performance, when compared to regular hearing individuals⁽¹²⁾. This difficult can be the result of their sensorial deficit, but also by other factors such as environment, that turns them into children of risk for the gradual acquisition of language development and, consequently, of learning the school curriculum in general⁽¹³⁾.

The CI user's reading and writing performance is often studied in first world countries⁽¹³⁾. However, in Brazilian literature, this is still a poorly debated subject, also including the fact that the protocols for reading and writing performance evaluations are systematized for hearing children⁽¹⁴⁾.

Considering the hypothesis that the reading and writing development of oral CI users may occur in similar fashion to the hearing person with phonetic and auditory hypotheses, the objective of this study was to describe the performance of reading and writing in CI users, by means of an integrative review.

RESEARCH STRATEGY

This study is an integrative review, which selected, gathered, analyzed and discussed findings developed by different methodologies, allowing the reviewers to synthesize them without hurting the epistemological filiation of the empiric studies included⁽¹⁵⁾.

To operate the review, six steps were followed: theme identification and hypothesis selection; study search in databases; study evaluation; data extraction from studies; result analysis and review presentation, considering the main question: How the reading and writing performance presents itself in CI users?

The study search occurred in the main data platforms: *Scientific Electronic Library Online* (SciELO) the biggest database in Brazil; PubMed and the Virtual Health Library (BVS) that ranges the following databases: *Medical Literature Analysis and Retrieval System Online* (MEDLINE), the biggest American medical database and Latin-American and Caribbean Literature in Health Science (LILACS), the biggest Latin-American database. The search was conducted during the months of august and september of 2019.

Four descriptors, in Portuguese and English, controlled by the Descriptors in Health Science (DeCS) were used: cochlear implant, education, child and reading, associated to the keywords: writing, hearing device and hearing implant, using the Boolean operator "AND" among the descriptors and "OR" among the keywords, in order to amplify the search.

Ten combinations of search strategy were made utilizing the descriptors and keywords in Portuguese, as well as in English. The search strategy in English is exemplified next: "Cochlear Implantation" AND Child AND Writing; "Cochlear Implantation" OR "Cochlear Implantations" AND Child AND Writing; "Cochlear Implantation" OR "Implantation Auditory" AND Child AND Education; "Cochlear Implantation" OR "Implantation Auditory" AND Child AND Reading AND "Cochlear Implantation" OR "Implantation Auditory" AND Child AND Writing; "Cochlear Implantation" OR "Implantation Auditory" AND Reading AND "Cochlear Implantation" OR "Implantation Auditory" AND writing; "Cochlear Implantation" OR "Implantation Auditory" OR "Cochlear Implantation" AND Child AND education; "Cochlear Implantation" OR "Implantation Auditory" OR "Cochlear Implantations" AND child AND Reading; "Cochlear Implantation" OR "Implantation Auditory" OR "Cochlear Implantations" AND Reading; "Cochlear Implantation" OR "Implantation Auditory" OR "Cochlear Implantations" AND Writing;

SELECTION CRITERIA

The inclusion criteria established for this review involve published studies in the last six years (2014-2019), available in any language, which described the reading and writing performance of CI using children inserted in a hearing rehabilitation program.

For exclusion criteria, it was established not to include: review articles (systematic, narrative or integrative), case reports, theses, dissertations, opinion articles, essays, studies with the sampling of individuals with comorbidities beyond hearing loss, or repeated by the superposition of databases, or those which didn't describe the hearing and writing performance of CI users.

The article were selected in sole form by two evaluators that independently read all titles and abstracts of studies obtained by means of pre-defined search strategies. In the cases where there wasn't agreement about the inclusion of an article, a third evaluator was solicited to arbitrate. Thus, for the final selection of the articles, the selected articles were fully read, as well as a research done about the reading and writing performance of CI users.

Data analysis

After the selection of the articles, the team proceeded in the full reading of these studies. For better presentation of the found data, the following variables were considered: author and year, type of study, publication, impact value, country,

sample, objective, age the participants received the CI, school year and conclusions about the hearing and writing performance of the children using the CI. The synthesis of the studies was evaluated in descriptive form and presented in Charts 1 and 2.

RESULTS

The present study presents an initial sample of 990 scientific articles found in the BVS and PubMed databases (Medline) = 947 (95.65%), LILACS = 22 (2.22%) e SciELO = 21 (2.13%). Starting from this main quantitative, the studies that didn't fit the predetermined criteria of inclusion and exclusion were excluded. Only eight articles were selected and included in the review. The flowchart below (Figure 1)

Chart 1. Summary of included studies

Author	Type of research	Publication	Impact value	Country	Sample	Objective
Wu et al. ⁽¹⁶⁾	Transversal	<i>Biomed Research International</i>	2.197	Taiwan	20 boys, 25 girls Users between 8 and 13 years old with cochlear implant.	Examining the narrative writing with CI-wearing children and analyzing the associated factors and unfavorable results.
Von Mentzer et al. ⁽¹⁷⁾	Transversal; control group	<i>Clin Linguist Phon.</i>	1.083	Sweden	22 children attending, 11 with CI and 11 with regular hearing, paired by age, varying from 5 to 8 years old.	Exploring the repetition of pseudowords (NWR) and the wordless decoding in children with regular hearing (RH) and in children wearing CI.
Apel and Masterson ⁽¹⁸⁾	Transversal	<i>J Deaf Stud Deaf Educ.</i>	1.556	USA	18 students: 09 with CI and 09 with regular hearing paired by reading age range. The age range varied from 8 to 11 years old.	Verifying the difference between the orthography abilities and, specifically, linguistic consciousness ability with and without CI.
Gallego et al. ⁽¹⁹⁾	Transversal; control group	<i>Res. Dev. Disabil.</i>	1.872	Spain	19 children who received the CI before 24 months of age (Early CI) and 19 who received after 24 months of age (Late CI) with a control group of 19 children with regular hearing. The age of the children was from 8 to 12 years old.	Comparing the sentence reading comprehension in children with early CI and late CI with a control group of 19 children with regular hearing.
Domínguez et al. ⁽²⁰⁾	Transversal	<i>J Deaf Stud Deaf Educ.</i>	1.556	Spain	77 children with pre-lingual and CI were between 6 and 18 years old. 59 hearing loss children with conventional hearing aid were between 8 and 17 years old.	Examining the mechanisms used by deaf children with and without CI to read sentences and linguistic basis (vocabulary and syntax) adjacent to these reading mechanisms.
Rezaei et al. ⁽²¹⁾	Transversal; control group	<i>Int J Pediatr Otorhinolaryngol.</i>	1.225	Iran	72 children divided into three groups: 24 with CI, 24 with hearing aid and 24 with regular hearing (AN). The age range was between 8 to 12 years old.	Examining the reading abilities in deaf Persian children with CI and hearing aid and comparing them with regular hearing people.
Göçmenler and Çiprut ⁽²²⁾	Transversal; control group	<i>Int J Pediatr Otorhinolaryngol.</i>	1.225	Turkey	19 students with CI and 20 students with regular hearing. The subject age varied between 12 and 14 years old.	Evaluating the abilities of filling of blanks and reading error within students with CI and comparing their results with their regular hearing pairs. The effects of implant age and total time of CI use were analyzed in relation to the development of reading ability.

Subtitle: CI = Cochlear Implant

Chart 1. Continued...

Author	Type of research	Publication	Impact value	Country	Sample	Objective
Pooresmaeil et al. ⁽⁵⁾	Descriptive-analytic study and transversal	<i>International Journal of Pediatric Otorhinolaryngology</i>	1.225	Iran	15 children with CI and 15 children with hearing ability.	Determining the relationship between syntax and reading comprehension in children with CI and hearing ones from the 3 rd to the 5 th year of middle school and identifying the relation between reading comprehension and the age of receiving the CI, as well as the duration of phonoaudiology treatments with children with CI.

Subtitle: CI = Cochlear Implant

Chart 2. Characterization of studies regarding school years, CI age, assessment tests and study conclusions.

Author	Sample	Implant Age	School Year	Evaluation test	Conclusion
Wu et al. ⁽¹⁶⁾	45 children with CI	Average implant age: 4 years old and one month;	2nd to 6 th years of "primary school"	<i>Written Language Ability Diagnostic Test for Children; Test of Reading Comprehension; Graded Chinese Character Recognition Test</i>	The implanted children tend to write shorter stories, disorganized and lacking in plot, while formulating morphosyntactically correct sentences. Special attention is necessary about their hearing and linguistic performance, which can lead to problems in written language.
Von Mentzer et al. ⁽¹⁷⁾	11 children with CI	Average of 20 months	Regular school; bilingual school (sign language and oral communication)	All children attended an intervention study assisted by computer with phonetic approach and three points in test (baseline, pre-intervention and post-intervention); <i>Sound Information Processing System (SIPS); The Test of Word Reading Efficiency.</i>	The absence of frequent and significant associations between wordless repetition and wordless decoding with children with CI in comparison with children with regular hearing suggests that these children to use, partially, other decoding strategies to compensate less precise phonoaudiologic knowledge, for example, lexicalization in wordless decoding, specifically, transforming a real word into a non-word.
Apel and Masterson ⁽¹⁸⁾	09 children with CI	Before 3 years old	Regular school; special and regular school	TOWRE (sub-tests <i>SWE and Phonetic Decoding Efficiency (PDE)</i>); Test of comprehension and efficiency of silent reading (TOSREC)	The correlations between orthography measures and reading of real words and reading comprehension were lower in CI-wearing students.
Gallego et al. ⁽¹⁹⁾	38 children with CI	19 before 24 months; other 19 between 24 months to 5 years old.	Primary School	<i>Semantic strategies detection test created; WISC-IV Perceptual Reasoning Index; WISC-IV Forward Digit Span (FDS); Peabody Picture Vocabulary test (Spanish version); Sub-tests "Grammatical structures (GS)" e "Repetition of Pseudowords (NWR)" PROLEC-R</i>	These findings are discussed in terms of differences in the receptive vocabulary and short-term memory and their implications for the comprehension of sentence reading.
Domínguez et al. ⁽²⁰⁾	77 children with CI	Between 8 months of life and 11 years old.	Primary school: 1st to 6 th year	READ test; SMT test	The reading and linguistic levels reached by CI-wearing children depend on their ability to extract information contained in the spoken language to which they were exposed. The level of reading of this group is not significantly different from the level of hearing children from the same age. All participating groups used the keyword strategy. Deaf children, including those who use CI since a certain age also showed deficit in dealing with content words when the tasks demanded profound associations between them.

Subtitle: CI = Cochlear Implant; PROLEC-R Test = Evaluation of Reading Processes for children; READ test = reading ability test; SMT= semantic strategies detection test

Chart 2. Continued...

Author	Sample	Implant Age	School Year	Evaluation test	Conclusion
Rezaei et al. ⁽²¹⁾	24 children with CI	2 years of age (on average)	“Basic School” (from 4 to 11 years old) not specifying the year	Nama test: Repetition of pseudowords; word reading; reading of pseudowords; comprehension of words; text comprehension.	Considering the findings, the CI is not significantly more effective than the hearing aid at improving the reading skills. Of course that, even with considerable advancements in the hearing aid, many deaf children continue to think that literacy is a challenge
Göçmenler and Çiprut ⁽²²⁾	19 children with CI	12 received the implant before 36 months of age; 7 received after 36 months.	6 th , 7 th and 8 th years	<i>Informal Reading Inventory</i>	Even if being implanted early, there were significant differences in the reading performance of implanted students compared to those colleagues with regular hearing in older classes.
Pooresmaeil et al. ⁽⁵⁾	15 children with CI	Between 2 to 6 years old.	3 rd , 4 th e 5 th years	<i>Reading and dyslexia test (NAMA)</i>	Based on the findings of the present study, we can conclude that a focus in syntax comprehension in the intervention can improve reading comprehension. It seems that working with complicated structures, in particular, helps the children improve their reading comprehension. The syntax comprehension skills affect the reading comprehension in children with CI, and the biggest relation can be found in reversible syntax structures and in structures related to verbs.

Subtitle: CI = Cochlear Implant; PROLEC-R Test = Evaluation of Reading Processes for children; READ test = reading ability test; SMT= semantic strategies detection test

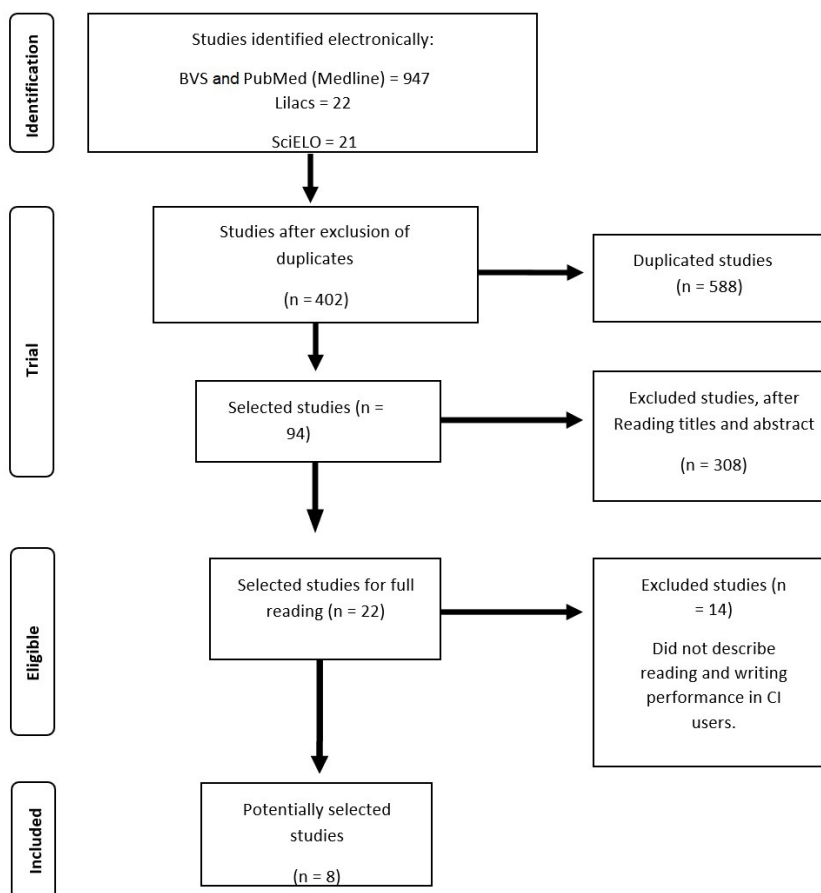


Figure 1. Flowchart of the number of articles found and selected after the application of inclusion and exclusion criteria

Subtitle: CI = Cochlear Implant; n = number of studies

presents a summary of all the search process and research article selection.

Chart 1 presents a synthesis of the included articles in this study, considering the following variables: author and year, type of research, publication, impact value, country, sample and objective.

From this synthesis, the study can notice that countries of the European continent (Spain) and Asia (Iran) published the bigger incidence of studies in this area of interest. Considering the methodological line, the study could observe in Chart 1, three studies of the transversal type (37.5%)^(16,18,20), four transversal-type studies with the control group (50%)^(17,19,21,22) and only one descriptive-analytic and transversal study⁽⁵⁾.

During the study, 419 students were evaluated, being 238 (56.80%) CI users, organized as the control group and 181 (43.20%) regular hearing children. Thus, it was verified the 5-18 age range.

Considering the evaluation methods used during the studies, the study must point out that the authors did not follow a pattern. The tests were chosen according to the preference of each author, referring to the reading and writing abilities evaluated.

Chart 2 presents the categorization of studies about the evaluation testes used in the included articles of the review, besides presenting the sample size, the school year attended, the age average in which the participants received the CI and conclusions about each study.

DISCUSSION

The present study was elaborated with objective of describing the reading and writing of CI users by means of an integrative review. Due to the results obtained from this research, it was verified that CI users possess a significant disadvantage during the reading and writing development, being the latter even bigger, when compared to regular hearing individuals. Several are the factors that can influence in this development.

Amidst the selection, no Brazilian study was found published in online platforms relating to this theme, what demonstrates the small production about the theme within the country. Thus, a higher incidence of international publications was observed. The obtained results identify the countries in the European and Asian continents as the countries with the highest incidence of studies related to the reading and writing performance in CI users. Probably, this happens because the CI usage has a bigger history of effectiveness in hearing rehabilitation in these continents.

About the type of study, the methodological line with the biggest amount of results were the transversal studies. Probably because this type of study allows the analysis of collected data in one single period. Therefore, four studies, besides being transversal, used control group (50%)^(17,19,21,22). Within these, the authors needed a pairing between CI users and hearing participants. The evaluation methods used by the authors of the articles studied did not express a pattern, but showed efficacy evaluating and characterizing the reading and writing performances of CI users, considering that these are standard and valid tests in the reading and writing area of these users. None of the selected studies are Brazilian, which difficult the knowledge of clinics and researchers about what tests could be effective for the evaluation of these children in the Brazilian context.

Following this objective, all selected articles for the research affirmed that the reading and writing performance of CI users is considered smaller compared to the hearing population. Others studies, besides this review^(8,23), corroborate with the results obtained above. They highlight that CI using children possess a significant disadvantage of 2 to 3 years in the reading and writing development, when compared to regular hearing students attending the same school year^(8,23).

Only two studies^(16,18) presented a specific analysis of the writing of CI-using children. The results showed that, compared to regular hearing children, CI-using children write texts of lesser amount of words, story with no main point and, at describing images and objects, do not mention actions and feelings within the presented characters. Authors suggest that the absence of the capacity of developing and expressing a story can be associated to an unsatisfactory hearing input⁽¹⁶⁾.

Oral CI-wearing children with auricular approach for hearing rehabilitation must follow the same steps in acquisition of reading and writing in comparison to hearing children⁽⁸⁾. Therefore, even if the CI provides hearing sensations to children with severe/profound hearing loss, the acquisition of oral and written language seems to continue disadvantageous, when compared to their normal hearing colleagues⁽²²⁾. Being necessary a more intensive hearing rehabilitation program in the first years of life, with a bigger objective in the remedy of the delay of the phonoaudiologic conscience in the initial schooling years so they reach better levels of comprehension from the information received and a better dominance of the literacy process. According to the articles studied, the difficulty of reading and writing of CI users can be associated to a deficit in the receptive language of these users, in other words, they need bigger sound experiences to understand what is being communicated orally.

The great difficulty of the CI user is still developing and comprehending the oral language, which severally influences the learning of written language. The Brazilian education, for example, defends the visual support, the storytelling and dramatization of stories as strategies for the teaching of reading and writing among CI-wearing children. Besides a hearing training, the narratives also stimulate the sequential hearing memory, the increase of vocabulary and the language aspects, such as semantics and prosody, fundamental for the development of phonologic consciousness.

This way, it is of great importance that the storytelling is performed through a management program between readers and mediators, which can be initiated since they are babies^(24,25). CI-wearing children must also be benefitted by the work of educational phonoaudiology, as well as in the adapted and specialized educational consult to develop abilities of reading and writing⁽²⁶⁾ within the proposal of inclusion in each country.

From the analysis of evaluation tasks that involved the performance of reading and writing in CI and hearing aid users, the study observed a finding of only two articles (25%)^(20,21). A Spanish study showed that the reading levels between the groups did not present differences, because both groups possess difficulty dealing with more complex words, especially, when it is demanded associations between them⁽²⁰⁾.

On the other hand, Israeli scholars affirm that the use of CI is not significantly more efficient compared to the use of the hearing aid to improve reading abilities⁽²¹⁾. Perhaps because there are other variables, such as the inclusion process and the sociocultural status of the country, need to be taken into

consideration and not only the type of electronic hearing device utilized. With this, the study can affirm that countries with more complex style of sentencing will be able to influence directly the comprehension and elaboration of narratives of these CI-wearing children. The users, when exposed to this style of more complex sentences, possess more elaborate experiences, in relation to the context in which they are included.

However, a study confronts the result of researches quoted previously, affirming that the comprehension of reading among CI-wearing children is significantly better than the children who wear hearing aid⁽²⁷⁾. The findings within the aspects of hearing perception are unquestionable whether better benefit provided by the CI in comparison to the hearing aid for users with severe/profound pre-lingual hearing loss. However, such performance, from both groups, still finds itself behind when compared to the regular hearing children. Again, it is important to consider other necessary details in the fundamentals of these findings, such as the strategies used by these groups for the identification of content within a text.

The difficulty of comprehension of reading among these individuals can be associated with a deficit in the syntax processing of sentences, in other words, the individuals with severe/profound hearing loss do not receive the grammar rules in their entirety, which determine the correct structure of a sentence. Possibly making writing, altogether incoherent in consideration to the main idea of the text. Defending this assumption, according to studies, individuals with hearing loss execute semantic strategies that involve the comprehension of sentences⁽²⁸⁾. This strategy seeks to identify the content of the sentence, selecting target-words as closure of ideas, ignoring any other information presented.

About the evaluation of relations which involved the development of hearing and writing abilities, considering the “implementing age” and the “total time of CI use” variables, it was possible to observe only three articles (37.5%)^(5,19,22). Such results demonstrate that the individuals implanted early and/or late possess significant differences concerning the reading and writing performance in comparison to those possessing regular hearing^(5,19,22).

Early implanted children preferably use syntax clues when trying to comprehend and complete read sentences, meaning that, in the absence of an adequate understanding, these children seek words that insert themselves morphosyntactically in the sentence, which is similar to the abilities of children who possess regular hearing⁽¹⁹⁾. For late implanted children, semantic clues are used for this comprehension, according to the use of the keyword strategy. However, in some moments, these children employ syntactic signals, using both strategies⁽¹⁹⁾.

The only transversal, descriptive, analytic study included in this review affirms that even if the comprehension strategy of early implanted children is similar to the hearing children, there can be a difference in the reading performance between the groups⁽²²⁾. This way, researches show that children with profound hearing loss which receive the CI in an early age have a significant better performance in comparison to those who receive the implant in a later age^(29,30).

Despite the hearing benefits that the CI can offer to a child with hearing loss, the capacity of organizing a written story or expressing it by means of reading will be able of improvement with the increase of sound experiences from these users. This way, the more exposed to hearing input the child is, the better will be their capacity of coding and decoding the words. In other

words, the importance of rehabilitation programs after the CI is verified, along with an adequate educational consultation for the CI users in their scholar environment.

CONCLUSION

This literature review indicated that, even with the use of CI, the reading and writing performance is behind the expected for the age range and school year. Besides that, CI users presented an inferior performance compared to the hearing population when compared. This deficit can be associated to the receptive language of these users, in other words, they need greater sound experiences to comprehend what they are listening, so that, starting from this, they can improve their coding abilities (reading) and decoding (writing).

Besides this, implements within the inclusion process can favor the best results in the school performance of CI users, as a reading management suggested by researchers. From the analyzed studies, the study identifies the lack of researches about the reading and writing performance of CI users in Brazil, making necessary, therefore, more studies and publications referring to this theme.

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