

MENDIVE



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Original article

Early detection of difficulties in the reading-writing process of four- year-old infants

Detección temprana de dificultades en el proceso lectoescritor de infantes de cuatro años

Detecção precoce de dificuldades no processo de leitura-escrita de crianças de quatro anos

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ABSTRACT

Phonological processing refers to the set of capabilities that allow operations to be carried out with linguistic units and that are closely related to learning to read and write. The objective of this article was to socialize the results of the evaluation of phonological processing for the early detection of difficulties in the reading and writing process of four-year-old in the province of Tungurahua, Ecuador. It had a quantitative approach, a descriptive and transversal design, ex post facto. The population consisted of four-year-old infants from the Huambaló parish in Tungurahua and the sample with which we worked were 20 infants who met the established inclusion and exclusion criteria, to whom the Test for the early detection of difficulties in learning to read and write. As a result, it was obtained that these infants presented slight difficulties in their phonological processing, which can negatively affect the development of the reading-writing process.

Keywords: phonological processing; dyslexia; literacy process.

RESUMEN

El procesamiento fonológico hace referencia al conjunto de capacidades que permiten realizar operaciones con unidades lingüísticas y que guardan una estrecha relación con el aprendizaje lectoescritor. El objetivo de este artículo fue socializar los resultados de la evaluación del procesamiento fonológico para la detección temprana de dificultades en el proceso lectoescritor de infantes de cuatro años de la provincia de Tungurahua, Ecuador. Tuvo un enfoque cuantitativo, un diseño descriptivo y transversal, ex-posfacto. La población estuvo constituida por los infantes de cuatro años de la parroquia Huambaló en Tungurahua y la muestra con que se trabajó fueron 20 infantes que cumplieron los criterios de inclusión y exclusión establecidos, a quienes se les aplicó el Test para la detección

temprana de dificultades en el aprendizaje de la lectura y la escritura. Como resultado se obtuvo que estos infantes presentaron dificultades leves en su procesamiento fonológico, lo que puede incidir negativamente en el desarrollo del proceso lectoescritor.

Palabras clave: procesamiento fonológico; dislexia; proceso lectoescritor.

RESUMO

O processamento fonológico refere-se ao conjunto de capacidades que permitem realizar operações com unidades linguísticas e que estão intimamente relacionadas com a aprendizagem da leitura e da escrita. O objetivo deste artigo foi socializar os resultados da avaliação do processamento fonológico para a detecção precoce de dificuldades no processo de leitura e escrita de crianças de quatro anos na província de Tungurahua, Equador. Teve abordagem quantitativa, desenho descritivo e transversal, ex post facto. A população foi constituída por crianças de quatro anos de idade da paróquia de Huambaló em Tungurahua e a amostra com a qual trabalhamos foram 20 crianças que atendiam aos critérios de inclusão e exclusão estabelecidos, a quem o Teste para a detecção precoce de dificuldades na aprendizagem da leitura e da Escrita. Como resultado, obteve-se que esses bebês apresentaram pequenas dificuldades em seu processamento fonológico, o que pode afetar negativamente o desenvolvimento do processo de leitura-escrita.

Palavras-chave: processamento fonológico; dislexia; processo de alfabetização.

INTRODUCTION

Language development is an area of great relevance during the first years of an infant's life, since its sensitive period is located in the first seven years. According to Poussin (2017), sensitive periods "are internal predispositions that push the child to focus on an aspect of his environment, which at that time is necessary for his development and corresponds to a stage of his growth" (p. 64). Although it is true that infants are not born directly with a developed language, they already have the brain mechanism for their development before they are born, as long as they have stimulating environments.

Due to this period of sensitivity or window in the development of language, it is essential that, if warning signs are shown in the acquisition of the literacy process, action is taken as early as possible. In this way, this intervention could achieve more effective results, with a less frustrating process for infants, since it would be acting in parallel with the child's natural biological and cerebral development.

Consequently, it is necessary to start from an appropriate and early diagnosis, which includes all the components that intervene in these paralinguistic acquisitions. To carry out this research, the test by Cuetos *et al.* (2017), published in the Journal of Primary Care Pediatrics, where the following components of phonological processing are evaluated: phoneme discrimination, syllable segmentation, phoneme identification, pseudo word repetition, memory span across digits, and verbal fluency.

Prelinguistic skills begin between the ages of 3 and 6, a period of maximum brain plasticity. Indeed, there are various milestones to be reached and skills that must be developed so that this literacy process can be achieved between 6 and 7 years of age, the age at which a child's brain and body are mature enough to do so.

Literacy learning represents one of the most significant educational processes and has a strong role in the academic success of infants. It is argued that reading and writing skills are currently essential skills, since they allow you to be part of an existing social system, also characterized by a strong technological component (Puñales *et al.*, 2017).

Learning to read and write is one of the greatest challenges that children face in their school years. Unfortunately, most diagnoses of situations of dyslexia or reading delay come at times after the sensitive period of language, that is, in adolescence and even in adulthood. The more time that elapses between the diagnosis and the intervention, the more difficult it becomes to recover from these processes (Cuetos, 2010; Cuetos *et al.*, 2017).

Likewise, it should be considered that the difficulties or delays in the reading-writing process are inseparable from the overall learning process. This means that difficulties in this area are directly associated with school failure rates. Nevertheless, the factors related to the academic field, there are manifestations linked to socio-emotional development, indisputably, since the existence of a gap between what a child is capable of doing and what he should do according to performance achievement levels, or according to the level observed in their peers, directly affects the security and self-esteem of the apprentices.

One of the disorders related to the process of acquiring literacy, which has the greatest impact on the school life of infants, is dyslexia. Which, as mentioned above, usually has late detections. According to the World Health Organization (1992), dyslexia is classified as a specific reading disorder, in category F81, defining it as:

... a specific and significant deficit in the development of the ability to read

that is not explained by the intellectual level, visual acuity problem or inadequate schooling. Reading comprehension, recognition of words read, ability to read aloud, and performance in activities that require reading (sp) may be affected.

Notably, dyslexia and reading delay have been the most treated difficulties in terms of reading problems at school. The term dyslexia, according to Williams (1970), refers to a difficulty in reading, despite a standardized education, a good level of sociocultural integration and an adequate level of intelligence. That is, a problem in word recognition and spelling difficulties that negatively affects reading comprehension. Currently, it has also been related to a slow rhythm in the reading of words and an incomplete development in fluent and precise reading (Beltrán and Gutiérrez, 2020; Romero *et al.*, 2020; Di Folco *et al.*, 2020).

There are some aspects to be considered in the diagnosis of this disorder; some are related to school performance and others to personality disorders. According to Peña (2014), the following are found:

- in the academic field: affectations in oral language, reading, writing, mathematics, psychomotricity;
- in the behavioral field: problems of anxiety, behavior, school adaptation, low self-esteem and insecurity, among others.

Given the influence of this disorder on school performance and personality development of children and adolescents, an early diagnosis is relevant. Childhood, and even adolescence, are the most appropriate stages for preventive interventions, since at these ages the processes of acquiring knowledge, individual awareness, improvement of skills and motivation for the

development of habits are facilitated (Magaña & Ruiz, 2017).

On the other hand, Duffy *et al.* (2014) affirm that, for reliable and lasting effects in the intervention of dyslexia, a long-term treatment is necessary, which allows the appropriation of learning in terms of phonological awareness. There are several studies that have shown the close relationship between this and the reading-writing process. For example, longitudinal studies, which demonstrate the relationship between the development of phonological awareness and a greater readiness to read and write; intervention studies that emphasize the connection between the training of phonological abilities and the improvement of the reading-writing process; and, finally, studies that show that children with phonological deficits have problems in later life for reading and writing (Cuetos *et al.*, 2017).

So, due to the close relationship observed between the development of phonological and literacy skills, it is unquestionable to start with interventions in the preschool stage, since it is there that the development of phonological awareness begins informally, which, according to the Ministry of Education of Ecuador (MINEDUC, 2016), is the awareness that words are made up of sounds, with the phoneme-grapheme relationship as the ultimate goal.

The development of phonological awareness in spoken words occurs between the ages of four and six, and it is essential to learn the rules of grapheme-phoneme correspondence to identify words and to develop higher-order linguistic processes that allow obtaining the meaning of the text (Mera *et al.*, 2019).

In this sense, an early diagnosis confers benefits for further learning of reading and writing skills, as long as this is accompanied by relevant interventions with appropriate

learning methodologies (Andresen & Monsrud, 2021).

The objective of this work is to socialize the results of the evaluation of phonological processing for the early detection of difficulties in the reading and writing process of four-year-old in the province of Tungurahua, Ecuador. For this, a sample of 20 infants has been selected, to whom the test was applied individually, for the early targeting of difficulties in reading and writing. Subsequently, the results are presented and compared with the results of other authors.

MATERIALS AND METHODS

The article responded to an investigation based on the positivist paradigm with a quantitative approach, seeking to generalize phonological processing in the preschool stage and be able to predict its development. The research was descriptive and ex post factor. The purpose was to detect, preventively, the phonological features that in the future may represent risks associated with learning to read and write.

The study variable was phonological processing, in particular the processes and skills related to sound information and its processing. The following elements were considered as dimensions of phonological processing:

- phoneme discrimination
- Syllable Segmentation
- phoneme identification
- Pseudoword repetition
- short-term verbal memory

- Verbal fluency

The study population included four-year-old infants from the Huambaló parish, Tungurahua province. A non-probabilistic quota sampling was used. The sample consisted of a total of 20 infants, who met the inclusion criteria of belonging to the Huambaló parish, Tungurahua province, being between four years and 4 years 11 months and 30 days old, and having obtained parental consent to participate in the study. The exclusion criteria considered were: presenting some type of sensory deficit, autism spectrum disorder, diagnosed intellectual disability and not having the child's willingness to carry out the activities.

As a technique, the usefulness of standardized tests was recognized; In this case, the instrument "Test for the early detection of difficulties in learning to read and write" was used. This instrument consists of six (6) subtasks that correspond to the dimensions of phonological processing (phoneme discrimination, syllable segmentation, phoneme identification, pseudoword repetition, verbal short-term memory, verbal fluency). The application of the instrument was individual, with a duration of 6 to 10 minutes.

The instrument allowed recognizing the normative values in percentiles and cut-off points through the statistical analysis of frequencies. The results in each of the analytical subcategories were presented.

The research was carried out in three phases:

First phase: the background of the subject and the methodological aspects were reviewed; the informed consent of the parents was collected and the study sample was formed according to the aforementioned criteria.

Second phase: the instruments selected for the study and the collection of results were applied.

Third phase: the data obtained was processed through descriptive statistical analysis and frequency distribution with the statistical package IBM SPSS version 24; To determine the statistical significance of the results, the t-test was used for one sample.

RESULTS

The evaluation of phonological abilities in four-year-old was carried out using the test proposed by Cuetos *et al.* (2017), which is quick to apply, but highly sensitive to identify difficulties in this area.

Phonetic discrimination is one of the fundamental elements in language acquisition. In the phoneme discrimination exercise, the child must say whether two words are the same or different. Through discrimination, the child develops maturity in the acquisition of phonemes, fine phonological oppositions and gradually the control of the phonological system. The discriminative process impacts the learning of bucofonatory praxis and the recognition of the mixture of rhythmic sequences typical of language. In this indicator, the frequency that is repeated the most is 11, which represents 55%.

Syllable segmentation is another of the tasks evaluated. The syllable constitutes a pre linguistic knowledge scheme and it is fundamental in the stages of child phonological development. The task consisted of asking the child to segment words into syllables, accompanied by blows with their hands. According to the "syllabic hypothesis", the syllabic structure affects the organization of the child's cognitive schemes, since it allows the sound value of the letters to be identified in the first instance and in

later stages of the group of these (syllabic units). It is through this process that the child discovers that writing depends not only on the referent, but also on the structuring of words. In this process the highest frequency found is 8 and represents 40%.

Phoneme identification is part of phonemic awareness, which includes the ability to recognize the sound units of words. Phonemic awareness is one of the latest phonological skills to be developed and includes the ability to isolate, recognize, segment, and integrate phonemes. In this exercise, the child is expected to repeat a sound and identify it in a specific word. The highest frequency in this exercise is 8, which corresponds to 40%.

Pseudoword repetition is a sensitive activity for assessing the capacity of the phonological loop of working memory. The repetition of words recognized as unfamiliar causes an effort to be made to temporarily maintain the information and allows its subsequent reproduction. In this task, the frequency that is repeated the most is the value 4, which represents 40% of the study sample, and the second most repeated value is 5 (35%).

Another of the tasks applied was the repetition of digits, which evaluates phonological memory, an essential capacity in the reading-writing process. The value of 3 out of a total of 5 obtained a frequency of 12, which represents that 60% of the studied sample had that result.

Verbal fluency is one of the most used tests in the evaluation of phonological and literacy skills, since it implies the ability to organize one's own thought according to a specific category (animals in this case) in one minute. This type of task is considered complex due to the activation of attention and working memory. The frequency that was most repeated was 3 animals, in 10 infants, representing 50% of the total sample.

The sum of the scores for each of the tasks allowed to obtain a mean of 18.5 in the total of the test, with a deviation of 4.45. This result places the development of phonological skills in a performance with mild difficulties.

The development of phonological skills is so far one of the best predictors of learning to read and write. The results of this study show slight difficulties that can hinder the process, affect the pace of learning and the academic performance of students. All the results obtained, both by task and in general, were subjected to the T test for a sample, obtaining results with an asymptotic significance of 0.000 and evidencing their statistical relevance.

DISCUSSION

The evaluation of the phonological processing for the early detection of difficulties in the reading and writing process of four-year-old infants, from the province of Tungurahua, Ecuador, showed, for the sample studied, a performance with slight difficulties; lower results than those of the study developed by Cuetos *et al.* (2017), in a total of 298 children in a region of Spain, where a mean performance of 22.8 (deviation 4.42) was obtained in the execution.

Likewise, Cortés (2019) carried out the phonological processing evaluation in 30 four-year-old children in Madrid, Spain, having a mean result of 21.63 (deviation of 4.43), which is equivalent to a normal development and superior to that of this study. Maraza (2019) applies the same test to 120 boys and girls in Antiplano, Peru, who presented slight difficulties when applying the test to identify skills related to reading acquisition, results similar to those of this research.

By carrying out this study at the age of four, a stage where learning to read and write has just begun, it allows early detection of difficulties and therefore indicates the areas on which early intervention should focus, which allows a better preparation of the infant in his or her future learning.

By way of conclusion, it can be said that phonological processing is a basic skill of linguistic development and it is closely related to learning to read and write. In the preschool stage it is evaluated through phoneme discrimination tasks, syllable segmentation, phoneme identification, pseudo word repetition, memory span across digits, and verbal fluency.

Four-year-olds from the Huambaló parish in the province of Tungurahua present slight difficulties in phonological processing, which can negatively affect the acquisition of literacy and the academic performance of students in the first years of schooling.

It is important to detect difficulties in learning to read and write at an early age, for their effective intervention, facilitating their progress in later learning processes in infants.

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Conflict of interests

The authors declare no conflict of interest.

Authors contribution

All authors managed the information, reviewed the writing of the manuscript and approved the version finally submitted.



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