

## SPEECH DISORDERS AND GRADE RETENTION IN ELEMENTARY

### *Distúrbios de fala e dificuldades de aprendizagem no ensino fundamental*

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#### ABSTRACT

**Purpose:** to verify the prevalence of speech sound disorders (SSD) and its association to grade retention. **Methods:** 1,810 children, randomly selected and regularly registered in the 1<sup>st</sup> grade of Elementary Public Schools have been submitted to a speech sound disorder screening test (TERDAF). Data related to age and history of grade retention of the children elected to this study were collected in the school records after being authorized by children's parents. Association between SSD and grade retention were calculated by prevalence ratio and its 95% confidence interval. **Results:** children with SSD had more chances to grade retention when compared to those without this (PR 1.3; 95%CI: 1.1 – 1.5). The prevalence of SSD in this sample was 25%, taking into account the values of sensitivity and specificity of the screening test used. It was also verified that children with SSD have 1.3 times the risk to present history of grade retention, when compared to children without such disorders. **Conclusion:** the prevalence of SSD when the phonological acquisition must have been established denotes that such cluster is more prevalent than what literature is used to pointing out once few population epidemiologic studies concerning human communication are carried through.

**KEYWORDS:** School Health; Speech; Speech Disorders; Communication Disorders; School Health Services

#### ■ INTRODUCTION

Speech disorders can be broadly characterized as phonological (or evolutive phonological deviation, phonological disorder), phonetic deviation and phonetic-phonological deviation, according to the cause<sup>1-3</sup>.

Phonological disorder is a speech disorder characterized by inadequate production of the sounds and use of phonological rules of the language with respect to the distribution of the type of sound and syllable, resulting in collapse of phonemic contrasts affecting the meaning of the message<sup>2,4</sup>. These errors can also affect the child's ability to keep phonological information in working memory when the child needs to do tasks

of phonological awareness. It was reported that children with phonological alterations showed poor performance in memory tasks when compared to children of normal speech. This poor performance can be a strong indicator of success in the later ability to recognize letters<sup>4</sup>.

The Diagnostic and Statistical Manual of Mental Disorders - DSM IV<sup>5</sup> characterizes phonological disorder as "a failure in the use of speech sounds expected for the stage of development, appropriate for the age and dialect of the individual" (Criterion A), and may involve errors in production, use, representation or organization of sounds, such as, but not limited to substitutions of one sound for another or omissions of sounds. According to the Manual, the difficulties in the production of speech sounds interfere with academic or occupational achievement or with social communication (Criterion B). Phonological disorder includes errors of phonological production (ie, articulation), involving the failure to properly form the sounds of speech, as well as phonological problems of cognitive basis involving a deficit in linguistic categorization of

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Conflict of interest: non existent

speech sounds. Thus, the severity of the disorder varies, and may hinder or not the speech intelligibility.

The repercussions that human communication disorders can cause in the subject himself or his family are difficult to measure. However, clinical practice shows that these disorders end up influencing the relationship of the subject with the environment that surrounds him and his self-image, in addition to his formal and informal learning.

Several studies point to a relation between untreated speech disorders in childhood and residual difficulties in adolescence and adulthood in relation to oral and/or written communication, although the isolated speech disorders have better outcomes in terms of reading skills and learning in general than the broader disorders of language<sup>6-10</sup>. On the other hand, studies that relate phonological awareness and occurrence of writing difficulties in childhood highlight that to stimulate phonological awareness seems to be a facilitator for the acquisition of writing, providing the enhancement of metaphonological capabilities, although other internal and external factors might interfere with this acquisition<sup>11,12</sup>.

This study looked to determine the association between speech disorders and school failure in a sample of children regularly attending the first grade of elementary school.

## ■ METHODS

This study followed the guidelines of Resolution 196/96 of the National Health Council and was approved by the Research Ethics Committee of the Hospital de Clínicas of Porto Alegre under the number 01.013.

Cross-sectional study of secondary data based on a probabilistic sample of 1,810 children regularly enrolled in the first grade of elementary school selected from a list supplied by the municipal education secretary with the total number of students in 1st grade enrolled during the period when the information was collected.

Children with a previous diagnosis of mental, hearing or visual impairment were excluded.

To determine the sample size prevalence studies of speech disorders with the lowest estimates (around 4%; 95% CI 3-5%) were considered, so that the sample calculation, estimating losses of 10%, was 1,850 children.

The selection of tracking test used was done based on the premises that to collect data from a relatively large population and without complaints it is necessary to use a quick and easy-to-use test, validated for the population studied, as considered for conducting this study<sup>13-16</sup>.

The TERDAF<sup>13</sup>, a screening test used in this study consists of common images that are recognized by a pilot sample of the same age of the population studied, when the test was validated, with the goal of using the aspects that contribute to improve its accuracy<sup>13,15,16</sup>.

All subjects in the sample were subjected to TERDAF (Screening Test to detect Speech Sound Disorders)<sup>13</sup> individually, in the first half of the school year.

The TERDAF is a screening tool validated for Brazilian children and consists on the presentation of 20 figures representing all the Portuguese sounds, and the child has to pronounce the word referring to the picture shown (ex : picture of a flower = the child was expected to say "FLOWER"). Answers were classified into two types: correct (correct articulation of sounds for the picture shown) and inadequate (inadequate articulation of the sound corresponding to the picture shown), when the child responded appropriately to the figures shown, but did not recognize one or more of these she was classified as "did not recognize/no answer."

Data relating to age, sex and history of school failure have been collected from the student register, available in the school offices.

We checked the distribution of the variables studied and the crude association and adjusted for the age in relation to the exposure, speech alteration and outcome of school failure, objects of this study, considering statistically significance of  $p \leq 0.05$ .

## ■ RESULTS

The characteristics of the population studied are shown in Table 1.

The prevalence of speech disorder in children was 25% and the prevalence ratio between speech

disorder and school failure was 1.3 (95% CI : 1.1-1.5) compared the prevalence of disorder speech in children with and without a history of school failure. The analysis of the association between speech disorder and school failure by chi-square test is also significant ( $p = 0.004$ ), as described in Table 2.

**Table 1 – Characteristics of Population Studied**

Features		N	Relative Frequency (%)
Gender	Male	980	54.1
	Female	830	45.9
Age	< 5 years	7	0.4
	6 years	503	27.8
	7 years	862	47.6
	8 years	262	14.6
	9 years	96	5.3
	10 Years +	64	3.5
	Ignored	16	0.8
Speech disorder*	No	1167	45
	Yes	643	55
School failure history	No	1363	75.3
	Yes	447	24.7

\* crude value, \* considering the sensitivity (80%) and specificity (75%) of TERDAF, the prevalence (adjusted) is 25%.  
Legend: TERDAF= Screening Test to detect Speech Sound Disorders.

**Table 2 - Association between speech disorder (TERDAF +) and school failure**

TERDAF	History + School Failure N (%)	History - School Failure N (%)	PR (CI 95%)	Attributable Risk
Positive (speech disorder)	314	853	1.3 (1.1-1.5)*	6
Negative	133	510		
TOTAL	447	1363	-	-

\* Values adjusted for sensitivity (80%) and specificity (75%) of TERDAF  
TERDAF = Screening Test to detect Speech Sound Disorders

## ■ DISCUSSION

The data assessed from a representative sample of first-grade students of public elementary school provide subsidies for a broader and more systematized knowledge in relation to school performance, previous family school situation and the relationship of these elements with speech disorders in childhood.

It was estimated that the prevalence of speech disorders was about 25%, considering the sensitivity and specificity of the tracking test used<sup>13,16-19</sup>.

Based on other studies, the DSM IV<sup>5</sup> indicates that at least 2.5% of preschool children have speech disorders and there are studies that indicate that the prevalence of speech disorders in children is 10%<sup>20</sup>. A survey with Argentinian students<sup>19</sup> aged 5 to 14 years showed that 61% had speech disorder, and the prevalence was 89.6% in children aged 5 to 7 years.

That prevalence is much higher than those found in this study and is probably related to the diagnosis and/or different criteria of sample selection from those used in this study.

Phonological processes are universal and innate, and therefore, the initial basis is equal to all children. Therefore, it is possible to do a comparative analysis of the prevalence of speech disorders from studies conducted with speakers of different languages<sup>4,21-26</sup>.

Studies based on elementary students in Brazil, Argentina, Uruguay and the United States showed a prevalence of speech disorder in the order of 47.6% (pre-school ) ranging between 3.8% and 23% for elementary school students<sup>19,21-24</sup>. A study done in children from 3 to 11 years in the United States showed a prevalence of unknown cause speech disorder to be around 7.5%<sup>22</sup>.

Note that among the authors researched, the studies done with speakers of Brazilian Portuguese, English (North America or Europe) as well as studies conducted in Argentina, there is no consensus on the prevalence of speech disorders in children. These differences found are credited on the prevalence of the use of different classification criteria and/or diagnostic methods to characterize speech disorders, as well as ways of selecting samples in different studies<sup>13,19,21,25</sup>.

The adoption of a single nomenclature to characterize speech disorders recognizes that this disorder may have a history of both speech articulation (sensorimotor), as in phonological origin (cognitive-linguistic). In cases of phonological disorder the incapacity to communicate has a linguistic basis which occurs at different levels, the quantity and quality of phonological processes involved in vocal utterance directly linked to speech intelligibility<sup>4,26</sup>.

According to the literature, children with phonological disorders presented worse performance in memory tasks when compared to those with normal speech. The poor performance in memory skills can be a strong indicator of little success in the ability to recognize letters<sup>4</sup>. Studies have shown that children with speech disorders can present phonetic and phonological deviation, and those with phonological disorders may have difficulties both in the way of storing and representing phonological information in the mental lexicon as in the way to cognitively access or retrieve information<sup>19-22</sup>.

It is important to note that children under eight years are more likely to have speech disorders, when compared to older children; this fact can be attributed to several factors, including deficits in the metalinguistic development aspects. Obviously, such a discussion is applicable when there are no biological factors that contribute to the occurrence of such disorders as previously described by several studies<sup>22,27</sup>.

In the present study one must weigh the existence of a group of children under five years who presented TERDAF positive (presence of

phonetic and/or phonological speech disorder), and this finding could be associated with the final period of phonological acquisition and not to a phonological disorder itself<sup>13,19,28</sup>.

There is consensus that the development of linguistic consciousness does not emerge suddenly in the child's brain; this occurs as a result of biological evolution acquired in constant exchange with the environment or context that offers a continuous process of acquiring new increasing complex knowledge as to its manipulation and transformation<sup>7,17,29</sup>.

However, early diagnosis is important to access so that specialized treatment occurs early, seeking to reduce the occurrence of co-morbidities, as described by several authors in the international literature<sup>11,13,16,17,29</sup>.

In addition, data from this study have shown that children with speech disorders are in average 30% more likely to fail school compared with their peers who do not have speech disorders. On the other hand, these changes appear to be attributable to six out of ten school failure problems associated with speech.

Thus, comparing with the literature data that point to the association between untreated speech disorders and maintenance of the difficulties of oral and/or written communication, it would be important to apply tracking tests for detection of speech disorders, as it appears that these are quite prevalent in our environment and are directly related to the learning of reading and writing and literacy, among others<sup>2,4,9,19,21</sup>.

In addition, several cohort (longitudinal) studies point to the association between phonological awareness and future linguistic acquisitions related to oral communication and writing. Many children with phonological disorders show significant spontaneous improvement over the years, however, even during adolescence and adulthood, their performance in speaking, reading, writing and phonological awareness is worse when compared to their controls peer<sup>11,18,27</sup>. The same authors point out as a result of phonological difficulties in literacy (learning to read and write), behaviour disorders, interpersonal relationships associated with deviations in perception and phonological awareness and their use in oral communication (speech), as well as traces of phonological disorders in adolescence and adulthood if not treated in childhood. These results show the close connection between speech and language, whether oral or written.

The phonological system has been acquired by children with typical development when they are around 4 years, although a considerable maturation of the joint still happens in this age group<sup>7-17,18</sup>.

However, literature seems controversial even in this respect. Some authors refer to total remission of speech disorders without effects on written language of children, probably due to the fact that often the groups are separated among individuals with speech disorders and subjects with broader language disorders<sup>10</sup>.

Although the most comprehensive language disorders imply problems in reading and writing that go beyond literacy itself, the manifestations of speech in this population should have more evidence regarding the natural evolution of such disorders.

At the same time, considering the modern concepts of health and health promotion, the knowledge of factors related to speech disorders in a representative sample of a population of children may provide insight to the development of public policies for health care in school.

Once children with the risk of having learning disabilities are identified, there is a need for adequate

therapeutic intervention as speech disorders may be an early sign of difficulty in reading/writing in the future<sup>30</sup>.

Furthermore, the possibility of effective communication is an important factor to consider in terms of promotion and maintenance of health, beginning in childhood, whereas access to epidemiological data should follow the social advancement and new accessed knowledge should be incorporated into the management of health-disease process<sup>14,15</sup>.

## ■ CONCLUSION

There is a directly proportional relationship between speech disorders and school failure and inversely proportional to the occurrence of speech disorders as the child's age increases.

That is, younger children are more likely to have speech disorders and children with speech disorder are more likely to have difficulty in school resulting in failure.

## RESUMO

**Objetivo:** verificar a associação entre distúrbios de fala e repetência escolar. **Métodos:** uma amostra aleatória de 1.810 crianças regularmente matriculadas na 1ª série do ensino fundamental de escolas públicas foram submetidas a um teste de rastreamento de distúrbios de fala (TERDAF). Os dados referentes à idade e ao histórico de repetência das crianças foram coletados nos registros da escola. A associação entre distúrbios de fala e repetência escolar foram calculadas pela razão de prevalência e intervalo de confiança 95%. **Resultados:** a prevalência de distúrbio de fala nesta amostra foi de 25%, considerando os valores de sensibilidade e especificidade do teste de triagem utilizado. Também foi verificado que as crianças com distúrbios de fala possuem 1,3 vezes (IC 95% 1,1-1,5) o risco de apresentar história de repetência, quando comparadas aos seus pares sem distúrbio de fala. O risco de repetência atribuível ao distúrbio de fala foi de 6,2. **Conclusão:** o distúrbio de fala entre crianças que frequentam a primeira série do ensino fundamental apresenta alta prevalência e está associado com dificuldades de aprendizagem que venham a resultar em repetência escolar, mesmo quando na ausência de dificuldade auditiva detectável.

**DESCRIPTORIOS:** Saúde Escolar; Fala; Distúrbios da Fala; Transtornos da Comunicação; Serviços de Saúde Escolar

## ■ REFERENCES

1. Wertzner HF, Herrero SF, Iderilha PN, Pires SCF. Classificação do Distúrbio Fonológico por meio de duas medidas de análise: porcentagem de consoantes corretas (PCC) e Índice de Ocorrências dos Processos (PDI). *Pró-Fono R Atual Cient.* 2001;13(1):90-7.
2. Wertzner HF, Papp ACCS, Amaro L, Galea DES. Relação entre processos fonológicos e classificação perceptiva de inteligibilidade de fala no transtorno fonológico. *Rev Soc Bras Fonoaudiol.* 2005;10(4):193-200.
3. Castro MM, Wertzner HF. Estimabilidade e tipos de erro de fala. *Rev Soc Bras Fonoaudiol.* 2006;11(1):1-9.
4. Peterson RL, Pennington BF, Shriberg LD, Boada R. What influences literacy outcome in children with speech sound disorder? *J Speech Lang Hear Res.* 2009;52(5):1175-88.



5. DSM-IV. Transtornos Geralmente Diagnosticados pela Primeira Vez na Infância ou na Adolescência. In: DSM-IV - Manual Diagnóstico e Estatístico de Transtornos Mentais. 4. ed. Porto Alegre: Artes Médicas, 1995. p. 37-119.
6. Stevenson J. Predictive value of speech and language screening. *Develop Med & Child Neurol.* 1984;26:528-38.
7. Lewis BA, Freebairn L. Residual effects of preschool phonology disorders in grade school, adolescence and adulthood. *J Speech Hear Res.* 1992;35(4):819-31.
8. Beitchman JH, Wilson B, Brownlie EB, Walters H, Inglis A, Lancee W. Long-term consistency in speech/language profiles: behavioral, emotional, and social outcomes. *J Am Acad Child Adolesc Psychiatry.* 1996;35(6):815-25.
9. Stackhouse J. Fala, Ortografia e Leitura: quem está em risco e porquê? In: Snowling M, Stackhouse J e col (org). *Dislexia, fala e linguagem: um manual do profissional.* Porto Alegre: Artmed, 2004. p. 23-41.
10. Paula GR, Mota HB, Keske-Soares M. A Terapia em consciência fonológica no processo de alfabetização. *Pró-Fono R Atual Cient.* 2005;17(2):175-84.
11. Lewis BA, Freebairn LA, Taylor HG. Academic outcomes in children with histories of speech sound disorders. *J Commun Disord.* 2000;33(1):11-30.
12. Leitao S, Fletcher J. Literacy outcomes for students with speech impairment: long-term follow-up. *Int J Lang Commun Dis.* 2004;39(2):245-56.
13. Goulart BNG, Ferreira J. Speech disorder screening test for children. *Pró-Fono R Atual Cient.* 2009;21(3):231-6.
14. Goulart BNG, Chiari BM. Speech disorders prevalence in public schools first grade students and associated factors. *Journal of Public Health.* 2007;41(5):726-31.
15. Chiari BM, Goulart BNG. The role of research methodology in the rational use of technology in monitoring and preventing communication disorders. *An. Acad. Bras. Ciênc.* 2009;81(3):497-502.
16. Goulart BNG, Chiari BM. Screening versus diagnostic tests: an update in the speech, language and hearing pathology practice. *Pró-Fono R Atual Cient.* 2007;19(2):223-32.
17. Nathan L, Stackhouse J, Goulandris N, Snowling MJ. Educational consequences of developmental speech disorder: Key Stage 1 National Curriculum assessment results in English and mathematics. *Br J Educ Psychol.* 2004;74(Pt 2):173-86.
18. Raitano NA, Pennington BF, Tunick RA, Boada R, Shriberg LD. Pre-literacy skills of subgroups of children with speech sound disorders. *J Child Psychol Psychiatry.* 2004;45:821-35.
19. Hotham y Oriol L. Prevalencia de Dislalias en los Alumnos de 1er. Año E.G.B de las Escuelas de Melincué [monografía]. Rosario: Universidad Nacional de Rosario; 2000.
20. Shriberg LD, Tomblin JB, McSweeney JL. Prevalence of speech delay in 6-year-old children and comorbidity with language impairment. *J Speech Lang Hear Res.* 1999;42(6):1461-81.
21. Smith SD, Bruce FP, Broada R, Shriberg L. Linkege of speech sound disorder to reading disability loci. *J Child Psychol Psychiatry.* 2005;46(10):1057-66.
22. Shriberg LD, Kwiatkowski J. Developmental phonological disorders - a clinical profile. *J Speech Hear Res.* 1994;37:1100-26.
23. Wertzner HF, Amaro L, Teramoto SS. Severity of phonological disorders: perceptual judgment and percentage of correct consonants. *Pró-Fono R Atual Cient.* 2005;17(2):185-94.
24. Rios VM. Estudio descriptivo sobre la prevalencia de dislalias en alumnos de 1º a 7º año (EGB): Escuela N° 1, "Melchor Echague", San Nicolas [monografía]. Rosario: Universidad Nacional de Rosario, 1999.
25. Scheuer CI, Stivanin L, Mangilli LD. Picture naming and memory in children: phonological and semantic effects. *Pró-Fono R Atual. Cient.* 2004;16(1):49-56.
26. Wertzner HF, Oliveira MMF. Similarities between phonologically disordered individuals. *Pró-Fono R Atual. Cient.* 2002;14(2):143-52.
27. Nacler K, Magnusson E. Language problems in poor readers. *Logoped Phoniatr Vocol.* 2000;25(1):12-21.
28. Morales MV, Mota HB, Keske-Soares M. Phonological awareness: performance of children with and without phonological disorders. *Pró-Fono R Atual. Cient.* 2002;14(2):153-64.
29. Catts HW, Fey ME, Proctor-Williams K. The Relationship between language and reading. Preliminary results from a longitudinal investigation. *Logoped Phoniatr Vocol.* 2000;25(1):3-11.
30. Foy JG, Mann VA. Speech production deficits in early readers: predictors of risk. *Read Writ.* 2012;25(4):799-830.

Received on: October 23, 2012

Accepted on: June 03, 2013

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