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Prevalence of speech and language disorders in children in the western region of São Paulo

Prevalência de alterações fonoaudiológicas na infância na região oeste de São Paulo

ABSTRACT

Purpose: To establish the speech-language disorders in children living in the western region of São Paulo; to assess associations between diagnosis hypotheses (DH) and the age, gender and origin of referral; and to investigate the degree of agreement between the complaint and the DH at the moment of speech-language screening. **Methods:** Observational epidemiological study conducted at a laboratory of Primary Health Care. A survey of 525 medical records of children between 2002 and 2011 was conducted. The following variables were analyzed: gender and age of the child; origin of referral, complaint reported by parents, diagnosis hypothesis and referrals. **Results:** There was a predominance of male children (68.3%) and of the age group between 3 and 5 years and 11 months (48.7%), referred by a health professional (51.9%) and with more than one complaint reported by parents (26.1%). The most frequent DH were Phonological Disorder (22.9%) and more than one Diagnosis Hypothesis (19.4%). Most children were referred to a clinic-school where screening was performed (77.9%). There was an association between DH and the variables age ($p < 0.001^*$), gender ($p = 0.008^*$) and origin of referrals ($p < 0.001$). The degree of agreement between complaints and DHs was moderate. **Conclusion:** It has been proven that there are different DHs according to age, gender and origin of referrals. The use of speech-language screening with the information provided by parents for tracking of speech pathology is recommended.

RESUMO

Objetivo: Identificar as alterações fonoaudiológicas em crianças residentes na região oeste de São Paulo; verificar as associações entre a hipótese diagnóstica (HD) e a faixa etária, o gênero e a origem do encaminhamento; e investigar o grau de concordância entre a queixa e a HD no momento da triagem fonoaudiológica. **Método:** Estudo epidemiológico observacional, desenvolvido em um laboratório de Atenção Primária à Saúde. Realizou-se o levantamento de 525 prontuários de crianças atendidas entre 2002 e 2011. As variáveis analisadas foram: gênero e idade da criança; origem do encaminhamento, queixa relatada pelos pais, HD fonoaudiológica e conduta estabelecida. **Resultados:** Houve predomínio de crianças do gênero masculino (68,3%), da faixa etária entre 3 anos e 5 anos e 11 meses (48,7%), encaminhadas por um profissional da Área da saúde (51,9%) e com mais de uma queixa referida pelos pais (26,1%). As HDs fonoaudiológicas mais frequentes foram *Transtorno Fonológico* (22,9%) e *Mais de uma Hipótese* (19,4%). A maioria das crianças foi encaminhada à própria clínica-escola em que foi realizada a triagem (77,9%). Houve associação entre HD fonoaudiológica e as variáveis faixa etária ($p < 0,001^*$), gênero ($p = 0,008^*$) e origem dos encaminhamentos ($p < 0,001$). O grau de concordância entre as queixas e as HDs foi moderado. **Conclusão:** Comprovou-se que há diferentes HDs fonoaudiológicas de acordo com a faixa etária, o gênero e a origem dos encaminhamentos. Recomenda-se a utilização de *screening* fonoaudiológico em conjunto com as informações fornecidas pelos pais para rastreamento das alterações fonoaudiológicas.

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INTRODUCTION

Hearing, speech and language have an important role in the child's social, emotional, behavioral and cognitive development. The development of speech and hearing in the child is a dynamic process; the causes of their dysfunctions can be varied⁽¹⁾ and the signals, either isolated or as a whole, may involve grammatical difficulties (syntax), vocabulary (semantics), rules of the linguistic system (phonology), significant word units (morphology), the social use of language (pragmatics), fluency and orofacial motricity. The epidemiological knowledge of these disorders offers the support needed for the implementation of organized actions to minimize their effects⁽²⁾. Thus, it is important that pediatricians, researchers and health executives have knowledge about the prevalence and incidence of child speech-language disorders⁽³⁾.

The international literature about the prevalence of communication disorders records that, among preschoolers and schoolchildren, 2.44% have communication disorders; that 61% of 24-months old children display expressive speech disorders; and that, in between 13% and 22% of children, late talker was associated with other neurodevelopmental disorders^(4,5). Expressive language is the domain which causes major concerns to most Canadian parents of children between 4 and 6⁽⁶⁾. Thus, it is consensual in the international literature the importance of speech-language screening in the first years of life and the rejection of the "wait and see" practice adopted by parents and by some health and educational professionals.

In Brazil, a survey on the distribution of communication disorders done with children assisted in a speech-language laboratory of a Primary Health Clinic (PHC)⁽⁷⁾ detected that 352 children showed at least one primary communication disorder, of whom 61% were males with ages prevailing between 3 years and 6 years and 11 months old. At two years of age, the diagnostic of speech development disorder prevailed; from 3 to 8, phonological disorders; and, at 9, reading and writing disorders.

In a previous study, the authors of the present research analyzed 503 medical records of patients of the FMUSP speech-language therapy clinic and found a predominance of male individuals with up to 5 years of age⁽⁸⁾. Thus, a more in-depth study of this child population is required.

Knowledge by health professionals, and especially pediatricians, as well as by governmental organs, about the frequency of speech-language disorders by gender, age and origin of referral^(9,10) is extremely important to minimize the negative effects of these disorders the earliest possible. It should be stressed that the studies analyzing the adequacy of the institutional assistance model and that suggest actions with more impact on the health of the population involved, respecting environmental concerns⁽¹¹⁾ and in harmony with temporal needs⁽¹²⁾, can also contribute toward the implementation of actions.

In this context, the objectives of this study were: to establish the epidemiological profile of speech-language disorders in children living in the western area of the city of São Paulo within a 10-year period; to check the associations between the diagnostic hypothesis and the age bracket, gender and referral origin; and to investigate the degree of accordance between the complaint and the diagnostic hypothesis at the moment of the speech-language screening.

METHODS

Approved by the Committee for Ethics in Research of Faculdade de Medicina of Universidade de São Paulo (number 072/11), this study, classified within the observational epidemiological, descriptive and retrospective type, was undertaken through a survey of 524 children users' medical records. All the medical records belonging to children between 0 and 11 years of age, completed, residing in the western region of the city of São Paulo and assisted at the Speech-Language Clinic of Universidade de São Paulo in the period between 2002 and 2011 were used. The only criterion for exclusion was the non-signing of the Agreement of Free and Informed Consent.

The children and their caretakers were submitted, during the years cited above, respectively, to an informal evaluation and an interview based on a specific form. The following papers were used: Identification sheet, Screening Protocol addressing closed and open questions on linguistic aspects (phonology, morphosyntax and semantics) of pragmatics, hearing, reading and writing, of the orofacial myofunctional system, of the fluency and voice; and the ABFW child language test⁽¹³⁾, comprising specific evaluations from the areas of Phonology, Vocabulary, Fluency and Pragmatics for analysis. After the application of these instruments, the diagnostic hypothesis and the most suitable referral were defined. All the proceedings were undertaken by a speech-language therapist with expertise in public health from the staff of the Speech-Language Therapy Clinic of Universidade de São Paulo. All the data were entered into the medical records.

The following data were collected in the medical records: gender and age of the child (classified within the age brackets Earliest Infancy: 0 to 2 years and 11 months; First Infancy: 3 to 5 years and eleven months; and Second Infancy: 6 to 11 years and 11 months); origin of referral (by health or educational professional; spontaneous demand and others), complaint reported by the parents, speech-language diagnostic hypothesis and conduct prescribed.

As for the complaint parameter, the information supplied by the parents was an exact transcription of the informer's words. Following that, with the consensus of two researchers, the complaints were categorized and included in one of the following areas: phonology (example: "exchanges sounds in speech"), fluency (example: "he stutters"), language (examples: "he 'eats' letters, exchanges words and has difficulty forming sentences; "he doesn't speak"), orofacial motricity (example: "speaks, but drags the tongue forward when speaking and swallows"), hearing (example: "he doesn't speak or hear anything"), reading and writing (example: "he has difficulty reading and writing"), voice (example: "he gets hoarse"), no complaint (example: mother has no complaint, but the teacher (*sic* mother) says he speaks too loud) and more than one complaint (example: "stutters and exchanges letters").

The Speech-Language Diagnosis Hypothesis (DH) was categorized as follows⁽¹⁴⁾:

- Phonological Disorder: "difficulty of speech, characterized by inadequate use of sounds, in accordance with age and regional variations, which may involve errors in the production, the perception or the organization of sounds", compromising the intelligibility of speech.

- Stuttering: “involuntary breaks in the flow of speech, characterized by repetition of sounds or syllables, lengthening of sounds, blockages, extended pauses and intrusions in words.”
- Oral Language Disorder: can be part of the manifestations of several states affecting the child’s development (syndromes; neurological compromise; autism spectrum disorder); the manifestations may or may not be deviations from typical development (delay in the acquisition and development of speech); and may present the following characteristics in the comprehension or production of oral language: phonological simplifications, restricted vocabulary, simplified grammatical structuring.
- Orofacial Myofunctional System Disorder: “alterations in breathing, chewing and swallowing” and lisp.
- Hearing Disorder: hearing loss (conductive and/or sensorineural) of any degree and audiometric configuration which results in difficulty to detect, recognize and understand speech.
- Reading and Writing Disorder: “alterations in the cognitive-linguistic capacities with a genetic-neurological origin”; and which compromise the activities of reading and of writing production.
- Dysphonia: “vocal distortions originating in the glottis (laryngeal signal), such as those coming from the filter (resonance of the vocal tract)”.
- No Disorders.
- More Than One Disorder: displays more than one of the alterations discriminated above.

As for the Conduct variable, the child’s caretakers received speech-language guidance pertinent to the moment and a place was defined to which the child should be sent for speech-language evaluation: to a specific laboratory of the Speech-Language Therapy Course (internal referral); or to a Primary Health Clinic or to a different Institution (external referral).

The data collected were subjected to statistical analysis using the software SPSS 18. A descriptive analysis of the parameters involved was undertaken and the inferential analysis was done using the χ^2 test and the Kappa index. The significance level adopted was 5%, and significant results were marked with an asterisk.

RESULTS

Male children (68.3%) and those from 3 to 6 years old predominated (48.7%). Notice the small number of children of up to 2 years of age (7.3%) (Table 1). There was a majority of children referred to a speech-language screening by a health professional (51.9%) (Table 1).

Most parents (26.1%) had more than one complaint. Isolated complaints were identified in the areas of *Phonology* (19.8%), *Language* (17%), *Fluency* (11.6%), *Orofacial Motricity* (11.3%), *Reading and Writing* (5.5%), *Voice* (2.7%), and *Hearing* (1.3%). A small percentage of parents had no complaint (4.6%).

The diagnostic hypotheses had different distributions; the most frequent were: *Phonological Disorders* (22.9%), *More Than One Hypothesis* (19.4%), *Myofunctional Oral System Disorders* (16.2%) and *Language Disorders* (15.1%) (Table 2).

Regarding Speech-Language Therapy conduct, the majority of children were referred internally, to the school-clinic of the Speech-Language Therapy Course where the screening was done (77.9%).

Some adjustments were required for the analysis of the association between the diagnostic hypothesis and the descriptive parameters: the 19 children with no disorders detected in the speech-language screening were excluded to avoid compromising the analyses; and the children with diagnostic hypothesis of Hearing Disorder (n=6) and Dysphonia (n=11) were grouped together, since in these two groups the categories contained few individuals and would compromise the analyses.

As for the age bracket, it was not feasible to consider children between 0 and 2 years old due to the absence of occurrences in some categories of speech-language diagnostic hypothesis, which made the analysis unfeasible. Among the children between 0 and 2 years old (n=38), the majority (52.6%) suffered from language disorders; 21.1% had disorders in more than one area; 5.3% had Phonological Disorders; 5.3%, Stuttering; 7.9% had Myofunctional Oral System Disorders; and 7.9% had no speech-language disorder.

There was an association between the age bracket and the speech-language diagnostic hypothesis in this population ($p < 0.001^*$), and, regarding Phonological Disorders and Language

Table 1. Distribution of the number of children per age bracket, gender and origin of referral (n=524)

Variable	Parameter	n	%
Gender	Male	358	68.3
	Female	166	31.7
Age bracket	0 - 2 years	38	7.3
	3 - 5 years	256	48.9
	6 - 11 years	230	43.9
	Spontaneous	110	21.0
Origin of referral	Health	272	51.9
	Education	96	18.3
	Others	46	8.8

Table 2. Distribution of the number of children according to speech-language diagnostic hypothesis

Diagnostic Hypothesis	n	%
Phonological Disorder	120	22.9
Stuttering	68	13.0
Language Disorder	79	15.1
Myofunctional Orofacial System Disorders	85	16.2
Hearing Disorder	6	1.1
Reading and Writing Disorder	35	6.7
Dysphonia	11	2.1
No disorders	19	3.6
More Than One Disorder	101	19.3
Total	524	100.0

Disorders, more children between 3 and 6 years old were diagnosed than would be expected randomly; while, concerning Myofunctional Orofacial System Disorders and Reading and Writing Disorders, the same was true for the children between 7 and 11 years old (Table 3).

An association was found in this population between gender and the speech-language diagnostic hypothesis ($p=0.008^*$), and, regarding Phonological Disorders, more male children were diagnosed than would be expected randomly; however, the same was true for female children in the case of Myofunctional Orofacial System Disorders (Table 3).

As for the origin of referral, the children with Hearing Disorders and Dysphonia diagnostic hypotheses were excluded, since, even when grouped together, their distribution would

make the analysis unfeasible. An association was found in this population between the origin of referral and the speech-language diagnostic hypothesis ($p<0.001^*$), and, concerning Phonological Disorders, there were more children coming by spontaneous demand of parents and referred by educational professionals than would be expected randomly; there was a greater spontaneous demand linked to Stuttering; regarding Language Disorders and Myofunctional Orofacial System Disorders there were more referrals by health professionals; and, in the case of Reading and Writing Disorders and More Than One Disorder, there were more referrals by educational professionals (Table 3).

Finally, there was a moderate degree of agreement between the complaints of parents and the diagnostic hypotheses ($k=0.514$, $p<0.001$) (Table 4).

Table 3. Distribution of children according to age bracket, gender, origin of referral and speech-language diagnostic hypothesis

Variables	Diagnostic Hypothesis							Total (n)		
	Phonological Disorder (n)	Stuttering (n)	Language Disorder (n)	Myofunctional Orofacial System Disorder (n)	Reading and Writing Disorder (n)	More Than One Disorder (n)	Hearing Disorder and Dysphonia (n)			
Age bracket	3 - 5 years	93	31	45	28	2	40	10	249	$X^2=92.425$ df=6 $p<0.001^*$
	6 - 11 years	25	35	14	54	33	53	7	221	
	Total	118	66	59	82	35	93	17	470	
Gender	Male	97	48	56	47	22	64	12	346	$X^2=17.464$ df=6 $p=0.008^*$
	Female	23	20	23	38	13	37	5	159	
	Total	120	68	79	85	35	101	17	505	
Origin of Referral	Spontaneous demand	34	20	19	7	6	17	--	103	$X^2=66.338$ df=15 $p<0.001^*$
	Health	41	33	46	65	9	50	--	244	
	Education	35	8	7	8	15	22	--	95	
	Others	10	7	7	5	5	12	--	46	
	Total	120	68	79	85	35	101	--	488	

*Significant results ($p < 0.05$) Chi-square Test

Captions: df = degree of freedom

Table 4. Distribution of the number of children according to parent complaints and speech-language diagnostic hypothesis between 2002 and 2011

Complaint	Diagnostic Hypothesis									
	Phonoaudiological disorder	Stuttering	Language disorder	Myofunctional Orofacial System Disorder	Hearing disorder	Reading And Writing Disorder	Dysphonia	No disorders	More than one disorder	Total
Phonology	73	2	6	8	0	2	0	1	12	104
Fluency	0	57	1	0	0	0	0	0	3	61
Language	12	0	56	1	0	0	0	6	14	89
Orofacial motricity	2	0	1	48	0	0	0	1	7	59
Hearing	0	0	0	1	1	0	0	3	2	7
Reading and writing	0	0	1	0	0	19	0	1	8	29
Voice	0	0	0	0	0	0	10	0	4	14
No complaint	3	0	1	9	2	1	0	2	6	24
More than one complaint	30	9	13	18	3	13	1	5	45	137
Total	120	68	79	85	6	35	11	19	101	524

DISCUSSION

This survey examined the epidemiological profile of speech-language disorders of 524 children from the western region of the city of São Paulo, after an analysis of the medical records in the period between 2002 and 2011.

The data gathered reveal an agreement with previous studies^(9,15-18) regarding the predominance of the male gender (Table 1). The vulnerability of boys regarding cognitive and speech development is evident from the early years of life^(19,20). It should be noted that the male gender prevailed in all diagnostic hypotheses established (Table 3).

Children in the age bracket between 3 years and 5 years 11 months old prevailed in this profile, confirming the findings of other researchers from the state⁽¹⁰⁾ (Table 1): it is most often at this age that parents detect the development disorders. These professionals need more awareness about the possibility of speech-language therapy intervention and/or orientation in the first two years of the child⁽²¹⁾. The earliest possible identification and stimulation increase the chances of a good prognosis. Children who remain undiagnosed and lack the resources to deal with speech and language disorders may come to have further alterations in other important development markers such as reading and writing⁽²²⁾, which may explain the percentage figure of children who have had more than one diagnostic hypothesis (19.3%) (Table 2).

It should be noted that the small number of children of up to two years and 11 months of age ($n=38$) limited the analysis to verify the association between the age bracket and the various speech-language diagnostic hypotheses, as this age is seen as critical for the development of oral speech and is currently seen as Earliest Infancy. We suggest undertaking further studies with small children. The distribution of children into these two age brackets (3 - 5 years 11 months and 6 - 11 years 11 months) in accordance with the diagnostic hypotheses indicated a significant association (Table 3), suggesting that different factors may interfere in this distribution, such as: the origin of the speech-language disorder being either developmental or acquired; and, in general, speech-language disorders appear associated with other primary or secondary pathologies to some other health issue⁽⁹⁾. There is also the possible interference of the time span between the identification of the problem and the date of screening (months and even years) or of the insufficient number of primary health services, which causes waiting lists.

Researchers from Minas Gerais point out the fact that 41% of the referrals are done by medical doctors⁽¹⁶⁾, a finding similar to that of this study, in which the health sector (including medical doctors, speech-language therapists and psychologists) was responsible for 50% of all referrals (Table 3). Pediatricians, who treat children and teenagers, especially in the area of neuropsychomotor development preventive medicine, are the first health professionals likely to identify speech, language and hearing disorders, by means of specific instruments, and to refer the child to an evaluation by a speech-language therapist as early as possible. These actions can intervene positively in the quality of life of the children and their family. It was observed that the Spontaneous Demand category occurred more often (21.0%) than that of referrals made by educational professionals (18.3%).

Parents revealed concern over their children's development of speech and language, although belatedly, which suggests that the population of the western region of São Paulo is reasonably aware of the speech-language therapist's field of action. The majority of referrals made by health professionals received the diagnostic hypothesis of Myofunctional Orofacial System Disorder. The referrals made by educational professionals and by spontaneous demand had the diagnostic hypothesis of Phonological Disorder more often than the others.

Most of the parents in this sample reported only one complaint (73.9%), a number similar to that found in a previous study⁽¹⁶⁾. The moderate agreement between the complaints presented by parents and the diagnostic hypotheses established by speech-language therapists (Table 4) suggests that some parents are able to identify and/or recognize speech and language disorders in their children⁽²³⁾. This reinforces the importance of speech-language screening and, after that, of detailed evaluation, especially in those children who present one or more risk factors associated with language development⁽²⁴⁾, such as family-related issues (single child and family background) and those related to the child (premature birth, long-term hospitalizations and presence of unhealthy oral habits).

The isolated diagnostic hypotheses established in this study are similar in part to those from a study undertaken in the state of Alagoas⁽²⁵⁾, that is, Phonological Disorders were more frequent (22.8%); however, there are differences in other aspects, since in second place came Myofunctional Orofacial System Disorder (16.2%), followed by Language Disorder (15.1%). This result shows the necessity of monitoring the epidemiological profile of the population in the different contexts within the country, independently of the child's age group, as the acquisition and development of speech and language are dynamic and complex processes that suffer interference from factors intrinsic and extrinsic to the child.

77.9% of the patients screened were absorbed by the school-clinic of the speech-language therapy service of Universidade de São Paulo, which may be related with the insufficient number of speech-language therapists hired by the regional Basic Health Units^(9,10,26). It is understood that the speech-language assistance rendered by the school-clinic is not intended to meet the whole demand from the population. This is the Government's responsibility, and thus one of the actions of the basic speech-language assistance is to find the children suffering from voice, speech, language and orofacial motricity complaints and direct them to Basic Health Units, either specialized or not. Thus, planning of preventive actions as well as of rehabilitation measures is needed for the sample involved in this study, and more specifically for the population of the western region of São Paulo, so that this figure can be lowered.

A limitation identified in this study was that it did not take into account the age at which the speech-language disorder appeared in the children of this sample; the age at the date of screening was considered instead. In the routine of medical assistance the parents often report the difficulty of access to speech-language therapy attention at the health units near their domiciles and the fact that they remain in the waiting queue

for months. We suggest including in the surveys the parents' estimate of the age at which they detected the disorder.

To reach this target, the data of the present survey have been handed over to all Basic Health Units of the western region of São Paulo, which will be in charge of informing the family health teams and NASF professionals, so that actions can be taken by common accord to help this population.

CONCLUSION

It has been proven that speech-language diagnostic hypotheses vary in accordance with the age group, gender and the origin of referrals. Male individuals were in greater number in all of the diagnostic hypotheses identified.

The prevalence of childhood speech-language disorders in the western region of São Paulo was greater in the Phonological Disorder category, followed by cases with two or more concurring diagnostic hypotheses. After breaking down per age bracket, the prevalence of Phonological Disorders in the First Infancy and Myofunctional Orofacial System Disorder in the Second Infancy becomes evident.

The prevailing age bracket in this study was that from 3 to 5 years 11 months old, which confirms that this is the most probable age for Speech-Language Disorders to become evident to the parents as well as to the school and to health professionals.

Knowledge is still lacking about the action of the Speech-language therapist in the first two years of age of the child, a period extremely important for the development of speech. The identification and stimulation as early as possible increase the chances of a favorable prognosis and lower the prospects of disorders at other important stages of development such as reading and writing.

The referrals made by health professionals were more frequent than those by spontaneous demand from parents, and the latter took place more often than referrals by educational professionals. Reflecting on the fact that educational professionals spend more time with the children than health professionals, we conclude this is a good subject for discussion.

The moderate agreement between the complaints from parents and the diagnostic hypotheses established by speech-language therapists stresses the importance of the guidance provided to parents at the Primary Health Units. We recommend using speech-language screenings along with the information supplied by parents in the routine pediatric examinations, so that speech-language disorders can be detected as soon as possible.

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Author contributions

IAL collected and tabulated the data, participated in their analysis and interpretation and helped write the article; GGT participated in the interpretation of data and helped in the final draft of the article; CH participated in the data collection and helped in the final draft of the article; LVF also participated in the data collection and helped in the final draft of the article; DRMA drew up the research project, participated in the collection, analysis and interpretation of the data and helped write the article.