Prevalence of phonological disorders in children from Salvador, Bahia, Brazil

Prevalência do desvio fonológico em crianças da cidade de Salvador, Bahia

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ABSTRACT

Purpose: To verify the prevalence of phonological disorders according to age, gender and socioeconomic level of children from Salvador, Bahia, Brazil. **Methods:** The sample comprised 2880 children of both genders from low, middle and high socioeconomic levels enrolled in public schools from Salvador, with ages ranging from 4 years to 6 years and 11 months. Initially, all children were individually screened for speech-language and hearing disorders. Moreover, an anamnesis was conducted with caregivers/parents, and teachers answered to an interview. After that, a phonological assessment and a contrastive analysis were conducted, in order to diagnose children with phonological disorders. The prevalence of phonological disorder was calculated, and statistical analyses were performed. **Results:** The prevalence of speech disorders was 9.17%. It was verified a higher prevalence of phonological disorders for male subjects. In addition, when genders were associated to the variables "age" and "socioeconomic status", the prevalence varied statistically. **Conclusion:** Biological and social factors might influence the acquisition of phonological skills of oral language. Prevention measures and actions directed to identifying and treating phonological disorders should consider the different classes of socioeconomic development.

Keywords: Speech disorders; Prevalence; Child; Speech; Child development; Social class

INTRODUCTION

Prevalence is the number of people, in a certain population, who present a feature, in health, usually a disease, in a determined moment (often the moment in which an inquiry is performed)[1]. Epidemiologic studies do not offer the cause of the disease, but the found indexes help in the evaluation of the needs and of the planning of health services, to perceive if it is common, or rare, in a population[2].

Prevalence estimation of speech disorders in children modifies according to the method used and as higher the sampling number is, the more reliable it will be to determine the epidemiological index determined[3]. For some children, the processing of phonological information may happen differently from the expected. When this difference is characterized by disorganization or maladjustment of the children's sounds system in comparison with the pattern of their linguistic community, without any organic impairment, there is a phonological disorder[4].

According to the literature[3-5], the clinical picture of the phonological disorder is represented by unintelligible spontaneous speech, in children aged more than 4 years old, with normal hearing, well developed expressive and comprehensive language skills, and absence of organic impairments. The phonological disorder may involve as a limited number of speech sounds as more severe disorders, involving several sounds, resulting in reduced intelligibility[6].

A specific study[7] states that obtaining prevalence of phonological alterations contributes to the creation of speech-language prevention and intervention projects, in the language area. Besides, to know the variables which may influence the prevalence of a certain pathology favors the development of preventive actions. Thus, the purpose of this study was to verify the prevalence of phonological disorder and associate it with the variables regarding age, gender, socioeconomic level, in children from Salvador, Bahia (BA), Brazil.

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METHODS

This research is transversal and quantitative. It was performed after data collection from a research project approved by the Ethics and Research Committee, at Universidade Federal de Santa Maria, n. 23081.006440/2009-60. The adult responsible for the child signed the Consent Form (CF), according to Resolution 196/96. Besides, the participant's schools have signed the Term of Institutional Authorization.

First, to classify the socioeconomic level, it was performed statistical study based on the Socioeconomic Development Index (Idese)[8], considering the development indexes presented in the Yearbook of Salvador from 2003, in order to establish which regions the data collection would be performed in. After calculating the Idese[8], a random draw of one region was performed for each socioeconomic level (low, medium and high), as well as the municipal schools which receive the population of children from four to 6 years old in the selected regions.

To delimit the sample, with confidence of 95% and margin of error of 5%, through calculation of stratified sampling, proportional to the size of the previously referred groups, 950 children from 4 years and 0 months old to 4 years and 11 months old; 952 children from 5 years and 0 months old to 5 years and 11 months old; and 955 children from 6 years and 0 months old to 6 years and 11 months old should be part of the research. So the groups were organized.

However, in order to favor the comparison among the groups, it was established that each age group would present the same amount of subjects. Thus, for each age group, 960 children were selected. To reach the purposes of this study, which regarded the prevalence verification, considering not only age group, but also gender and socioeconomic level, it was established another convention to constitute the sample to be selected. So, for each group of 960 children, considering age group, there were 480 boys and 480 girls, 320 children from low socioeconomic level, 320 children from medium socioeconomic level, and 320 children from the high socioeconomic level. The total number of children was 2880.

To avoid any bias during the result analysis, it was decided that the data collection would happen with 1200 children from each age group. After the data collection, to compose the group, it was performed random draw of 960 children for each age group, following the features gender and socioeconomic level.

To select these 1200 children, it was asked the schools which were in regions with different levels of socioeconomic development the delivery of a list with the enrolled students who fit in the age group suggested by the study. Through this list, the responsible for each child was called, in alphabetical order, to be clarified about the study and to provide the consent to participate in the research. The total of evaluated children was 3600. They were in pre-school level of public schools from Salvador. However, 2880 children were included in the sample, with ages between 4 years and 0 months old to 6 years and 11 months old, male and female.

The exclusion criteria were: a) students whose parents and/or responsible people did not authorize the children's participation; b) students who did not complete all the evaluations, because they did not attend the evaluations for three consecutive times; c) students who were using psychoactive drugs, because the medicine could interfere in the results of the evaluations; d) students who presented hearing impairments in the hearing screening; e) students who were in psychological, neurological or psychiatric therapy; f) students who presented neurological and psychological significant alterations or syndromes, informed during the anamnesis with the parents and interview with teachers.

This study was performed in two different moments. In the first moment, all the children were submitted, individually, to speech-language and hearing screening. Besides, it was performed an anamnesis with the responsible for the children and an interview with the teachers. In a second moment, the Child's Phonological Assessment[9], with contrastive analysis was performed.

After the results of the speech-language screening and of the phonological evaluation, the children with phonological disorders were identified, following the literature criterion to diagnose phonological disorder[3-5]. Then, the data was tabulated in an electronic spreadsheet and submitted to statistical treatment through Chi-squared test, considering significance of 5% ($p<0.05$).

RESULTS

It was verified that the prevalence of phonological disorder was 9.17% (n=164 children) of the total population (2880 children). The age of 5 years old presented the highest prevalence (9.48%) when compared with the age of 4 years old (8.96%) and 6 years old (9.06%), but without difference among them. Thus, these results suggest that there is no pattern of increase or decrease of the phonological disorder, according to age group (Figure 1).

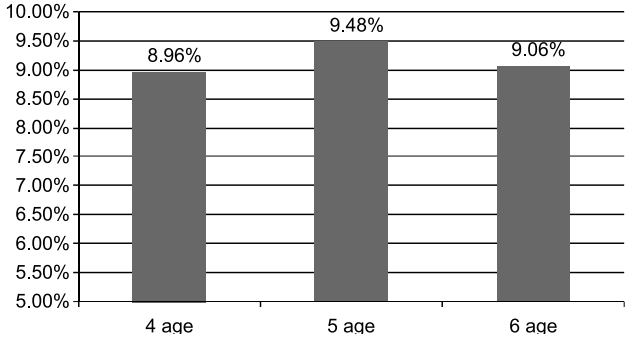
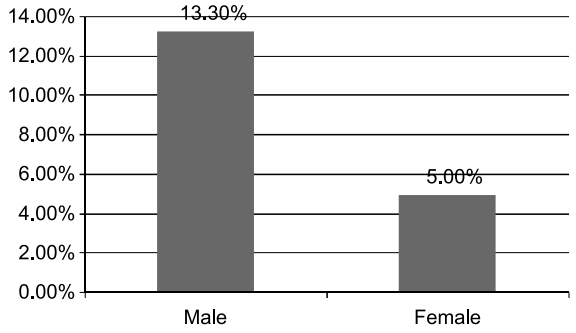


Figure 1. Prevalence of phonological disorders according to age

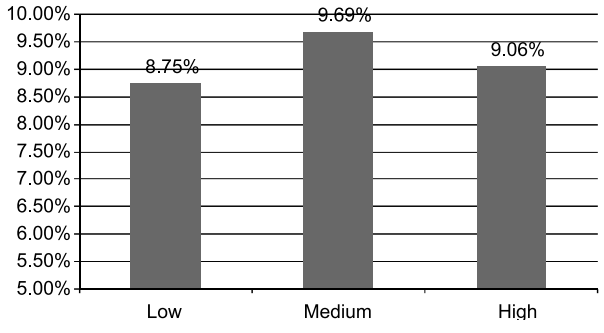
The prevalence of phonological disorders for the male gender was higher (13.3%) than for the female gender (5.0%), with difference between them. So, the found data allowed verifying ratio of 2.7 cases of phonological disorders of the male gender for each case of the female gender (Figure 2).

The medium socioeconomic level presented higher prevalence (9.69%) when compared with the low (8.75%) and high (9.06%) levels. However, there was no difference among them (Figure 3).



Chi-squared test (p=0.0001)

Figure 2. Prevalence of phonological disorders according to gender



Chi-squared test (p=0.9042)

Figure 3. Prevalence of phonological disorders according to socioeconomic level

The children with medium socioeconomic level presented the highest prevalence in each age group. Nevertheless, none of these differences was significant (Table 1).

There was lower prevalence of phonological disorders for the age of 5 years old (11.25%) when compared with the ages 4 and 6 years old (14.38% for both age groups). This difference was significant. Besides, it was observed that the male gender, in the age of 5 years old, the high socioeconomic level presented inferior prevalence of phonological alteration (4.38%) when compared with the low (14.38%) and medium (15.00%) levels, with significant difference among them (Table 2).

It was observed higher prevalence of phonological disorders for the age of 5 years old (7.71%) when compared with the ages of 4 (3.13%) and 6 years old (3.75%), with difference among them. Besides, it was verified that the female gender, with 5 years old, high socioeconomic level presented prevalence of superior phonological alteration (13.75%) when compared with the low (4.38%) and medium (3.75%) levels, with difference among them (Table 3).

DISCUSSION

The found prevalence of phonological disorders presented a percentage which is close to the indexes found in international

Table 1. Prevalence of phonological disorders according to socioeconomic level and age

Socio-economic level	Age									Total		
	4 years old			5 years old			6 years old					
	Studied population (N)	Cases of PD (n)	Prevalence (%)	Studied population (N)	Cases of PD (n)	Prevalence (%)	Studied population (N)	Cases of PD (n)	Prevalence (%)	Studies population (N)	Cases of PD (n)	Prevalência (%)
Low	320	26	8,13	320	31	9,69	320	27	8,44	960	84	8,75#
Medium	320	31	9,69	320	31	9,69	320	31	9,69	960	93	9,69#
High	320	29	9,06	320	29	9,06	320	29	9,06	960	87	9,06#
Total	960	86	8,96#	960	91	9,48#	960	87	9,06#	2880	264	9,17#

Chi-squared test (p<0.05)
Values without significant difference
Note: PD = phonological disorder

Table 2. Prevalence of phonological disorders according to socioeconomic level and age of the male gender

Socio-economic level	Age									Total		
	4 years old			5 years old*			6 years old					
	N=480	n=69	P=14.38	N=480	n=54	P=11.25	N=480	n=69	P=14.38	N=1440	n=192	P=13.33
Low	160	21	13.13	160	23	14.38	160	24	15.00	480	68	14.17
Medium	160	26	16.25	160	24	15.00	160	22	13.75	480	72	15.00
High*	160	22	13.75	160	7	4.38	160	23	14.38	480	52	10.83

* Significant values (p<0.05) – Chi-squared test
Note: N = number of the studied population; n = number of cases of phonological disorder; P = prevalence of phonological disorder (%)

Table 3. Prevalence of phonological disorders according to socioeconomic level and age of the female gender

Socioeconomic level	Age									Total		
	4 years old			5 years old*			6 years old					
	N=480	n=17	P=3.54	N=480	n=37	P=7.71	N=480	n=18	P=3.75	N=1440	n=72	P=5.00
Low	160	5	3.13	160	8	5.00	160	3	1.88	480	16	3.33
Medium	160	5	3.13	160	7	4.38	160	9	5.63	480	21	4.38
High*	160	7	4.38	160	22	13.75	160	6	3.75	480	35	7.29

* Significant values (p<0.05) – Chi-squared Test
Legend: N = Number of the studied population; n = number of cases of phonological disorder; P = prevalence of phonological disorders (%)

studies[5,10-13]. Among these studies, some of them are related to the American population, with prevalence of 10%[10], to the Cuban population, with prevalence of 12%[11], to the Italian population, with prevalence of 15%[12,13], and to the Chinese population, with prevalence of 16%[5].

However, considering the national literature, the found prevalence was similar to only one study[14] which found 10% of phonological alterations in children from 5 years and 4 months old to 6 years and 11 months old, from the city of Porto Alegre (RS), Brazil. In most of the studies which verified the prevalence of phonological disorders in the Brazilian population, the found prevalence indexes were higher. National studies detected, for example, indexes of 18.55%[15], 27%[16] and 34.16%[17].

It is important to consider that the difference found among the percentage of the mentioned prevalence may be justified by the fact that such studies[15-17] include a more inferior number of subjects than the present research and, in these situations, the idea of selection and "influence variable". Such variable could favor the speech alterations, because they are more sensitive to acceptation, aiming at receiving help to the case[15].

This justification can explain the closeness of the prevalence indexes of the present study when compared with international studies[5-10-13,18], in which the studied populations are higher and more comprehensive than this research. However, this variability of found percentages may also occur because of the improbability to exactly state how many people present specific communication disorders, as researches use several definitions for disorder, in different target populations[19]. This information may be clarified in the verification of the data from the study performed in 2006 in the south of Brazil[15] which allowed the presence of no more than two myofunctional alterations in children with phonological disorders, different from what was developed in this study, which excluded all possible myofunctional alteration which could interfere in the speech results.

When analyzing the prevalence of phonological disorders in different age groups, the fact that age does not influence the prevalence of the disorder is an important finding, because it allows the confirmation that these children, in the age group of 4 years old, present complete phonological acquisition, information which agrees with the data from other authors[4,9].

This interpretation is possible, because as a child acquires the most important phonological rules, keeping the contrasts, the speech intelligibility increases. So, as there was no decrease in the phonological damage, evidenced when the age groups were compared, it is possible to state that the phonological skills are established when children are around 4 years old. So, the obtained data show the presence of phonological disorders in children who should have already been with the phonological system acquired[20].

About the prevalence regarding gender, the findings detected that the male gender influences significantly the prevalence of phonological disorders. Such finding agrees with other studies[3,7,15,17,21] which verified that there is more incidence of phonological disorders in boys. However, the findings differ from other researches[22,23], that used scale development to identify speech development delay to verify higher prevalence of speech alteration in girls.

The fact that the variable socioeconomic level does not statistically influence the prevalence of phonological disorders agrees with the findings of another study[18]. Nevertheless, it disagrees with other studies, which verified that there is influence of the socioeconomic situation in the process of phonological development[24-27], and the low level of social and economic development is considered as determinant to increase the risk of speech alterations[25,26].

The data of the present study, although they do not agree with the findings which are identified by literature, warn that the socioeconomic development is not always determinant to promote children's development delays. Thus, it is important to create promotions health proposals which consider not only the least privileged social classes, but also the other socioeconomic development classes. This concern agrees with information offered by an epidemiologic study which observed that the social epidemiology enables the understanding or not of the physical and social environment in the health status, facilitating the coordination of actions with common purposes, and opening new ways in the public health field aiming at a healthier population[28].

When considering the gender as isolated, according to age and socioeconomic level, the found prevalence for such variables was different. So, it is possible to infer that the divergence regarding the prevalence of phonological disorders according to gender, in researches[7,15,17,21,22,23] which do not consider the analysis of the socioeconomic level, may have occurred because of the sample selection. Therefore, some studies may have emphasized the population from lower socioeconomic levels and, so, they may have found prevalence in the male gender[5,7,17,21], or emphasized populations of higher socioeconomic level, what identifies prevalence of phonological disorders in female subjects[22,23].

CONCLUSION

The prevalence of phonological disorders found in Salvador (BA), Brazil is 9.17%, inferior to the prevalence mentioned by other studies in different parts of the country. Considering the variables "age", "gender", and "socioeconomic level", analyzed as isolated, it is concluded that only the variable gender interferes significantly in the prevalence of phonological disorders, and it is more prevalent for the male gender.

However, when the variables "age" and "socioeconomic level" are associated, according to gender, the prevalence varied statistically. Because of this, it is possible to infer that biological and social factors may influence the phonological skills of the oral language. So, the measures of prevention and action to identify and to treat the phonological disorder should consider not only the least privileged social classes, but also the other socioeconomic development social classes.

RESUMO

Objetivo: Verificar a prevalência de desvio fonológico conforme idade, gênero e nível sócio econômico de crianças da cidade de Salvador, Bahia, Brasil. **Métodos:** A amostra foi composta por 2880 crianças de ambos os gêneros, na faixa etária de 4 anos a 6 anos e 11 meses, de nível socioeconômico baixo, médio e alto, matriculadas nas escolas municipais de Salvador. Inicialmente, todas as crianças foram submetidas, de forma individual, à triagem fonoaudiológica e triagem auditiva. Além disso, foi realizada uma anamnese com os responsáveis e uma entrevista com os professores. Em seguida, foi realizada a avaliação fonológica e análise contrastiva, a fim de diagnosticar crianças com desvio fonológico. Calculou-se a prevalência do desvio fonológico e foi realizado tratamento estatístico. **Resultados:** A prevalência do desvio fonológico foi de 9,17%. Verificou-se maior prevalência do desvio fonológico no gênero masculino. Além disso, ao associar os gêneros às variáveis "idade" e "nível socioeconômico", a prevalência variou estatisticamente. **Conclusão:** Fatores biológicos e sociais podem influenciar na aquisição das habilidades fonológicas da linguagem oral. Medidas de prevenção e ações voltadas para identificar e tratar o desvio fonológico devem considerar as diferentes classes de desenvolvimento socioeconômico.

Descritores: Distúrbios da fala; Prevalência; Criança; Fala; Desenvolvimento infantil; Classe social

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