CHARACTERIZATION AND FOLLOW-UP OF CHILDREN WITH PHONOLOGICAL DISORDER

Caracterização e follow-up de crianças com desvio fonológico

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ABSTRACT

This study wanted to search the progress therapeutic data about a group of children with phonological disorder, as well as to characterize the demand of subjects, who were treated in a Speech Language Pathology's school-clinic, from March to September 2009. The goal of this profile has been to characterize this demand about gender, age, number of sessions, number and type of phonological processes presented at the beginning and end of therapy, and conduct. Twelve children participated in this study. They was both gender, with ages between five and eight years old, who had individually treatment based on method PROMPT and Contrastive approach. Four phonological evaluations was realized, before starting treatment, with a time interval of two months between them, being an initial, two intermediate and final one. In evaluations, children should nominate 34 figures representing vocabularies containing all possible phonemic of Portuguese. It was made a traditional phonological analysis and a verification of the corresponding phonological processes. The results have indicated that was a predominance of males and the main age was six years. The most common phonological processes in the first evaluation were cluster reduction, liquid simplification and simplification final consonant simplification. There was a decrease at the phonological processes mean number when it was compared to the first and last evaluation. As conduct, five children were discharged, four had remained at treatment after fourth evaluation and three children had shutdown/withdrawal. It is considered that the use of the individual speech-language pathology therapy with children based on the Contrastive approach and PROMPT method provides significant and rapid progress at phonological disorders.

KEYWORDS: Child Language; Speech-Language Pathology; Speech Therapypy

INTRODUCTION

Some children have developmental phonological disorders, which correspond to deviation in the phonological development, without any known organic etiology. Because they involve phonological processes and cognitive aspects, these disorders are understood as organizational disturbances, not articulation disorders[1,2].

From this point of view, the phonological disorder is defined as a speech disorder, characterized by a inadequate production of sounds and incorrect use of phonological rules of Language, affecting the meaning of the message. The diagnosis is made through the analysis of the child phonetic inventory, considering syllabic structures present in speech samples. For some authors[2], phonological deviations may restrict oral and written language possibilities and, consequently, impairing the child social and scholar performance.

Children with phonological disorder have normal hearing for speech levels, absence of anatomic or physiological abnormalities of speech production mechanisms, nonexistent neurological dysfunction relevant to speech production, adequate intellectual

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capacity for language development and good capacity in expressive language[3]. A recent study related the expressive language performance with the severity degree of the phonological disorder through vocabulary testing[4]. The authors concluded that the types of substitution occurred in a similar way among children, apart of the severity of the disorder. These finding corroborates the idea that this group of children have adequate expressive language, even though they may show unintelligible speech due to consonant deviation used. Ergo, the therapeutic process geared exclusively towards decreasing persistent phonological disorders and the number of incorrect phonemes may have positive and favorable results.

Phonological disorder can begin to be diagnosed at age four, moment in which speech is normally intelligible to people strange to the child's immediate social ambient. Between age four and four and a half, phonological system is mostly acquired in children with normal spoken language development[3]. Although the exclusion criteria for a phonological disorder diagnosis are clearly defined, there are not enough conclusions about the etiology of this linguistic condition in these children.

In phonological disorder, the major difficulty is the articulation, which is characterized as the process used in the planning and execution of regular movement of speech organs. Therefore, implicates in the ability to move them in a fast and precise way to speak[5]. Articulation mistakes occur due to a disorganization in a peripheral level of the articulation process. According to the study above, most frequent phonological processes are: stopping, velar fronting, palatal fronting, gliding of liquids, final consonant simplification, consonant cluster simplification, devoicing of stop sounds or fricatives[5].

Authors concluded that the higher the severity of the phonological disorder, the higher the occurrence of repair strategies, once children still do not know the segment or do not dominate it's production[6]. Nevertheless, many studies [7,8] have shown that even in severe phonological disorder cases there are great recovery possibilities.

Literature stresses the importance of early speech pathology intervention in phonological disorder cases, targeting the facilitation of the child sound system reorganization, based on an adult pattern system[9]. Such intervention helps in the elimination of persistent processes in the child's speech and in the generalization of correct sounds. Authors refer that early speech pathology intervention accelerates the normalization of child's phonological system, leading to the generalization of sounds of spontaneous speech, decreasing the struggle of reading and writing learning, ability that depends directly on phonological processing[10]. Considering children with phonological disorders may show decreased phonological awareness[11], attention should be given to this population during the beginning of literacy process and school learning. A twins research, where both showed phonological disorder, pointed that the maintenance of the phonological disorder may be sustained by the environment[12] .

Researches about the speech pathology treatment of phonological disorder indicate the efficacy of different therapeutic approaches, each one with its especificities[8,12]. Each approach points to positive results according to the improvement in the phonological conditions and generalization of adequate productions.

The data above allow the inference of how vast is the literature about the speech pathology interventions on phonological disorders. On the other hand, there are still gaps, as these disorders involve individual aspects related to language development. So, as larger the number of alternatives to this type of intervention, the larger will be the number of children assisted. A review article[1] showed important gaps in recent publications: number of sessions needed for speech pathology discharge and use of group approaches; relationship between phonological and auditory processing disorder, working memory, phonemic discrimination; phonological awareness and written language development; etc.

On the need to propose a larger number of intervention alternatives to phonological disorder cases, this work aimed to present the therapeutic evolution data of a sample of 12 children, in order to analyze the efficacy of a therapeutic process of phonological disorder based on PROMPT and Contrastive approaches.

CASES REPORT

It was accessed 12 children, of both genders, between 5 and 8 years of age. They were all selected by the waiting list of the speech pathology teaching clinic of UNICNTRO, whose parents complained of speech disorders – (FIGURE 1). It is worth mentioning that not all information about language development history, orofacial myology characteristics and pre-, peri- and postnatal complications were given by guardians, who often referred not remembering or not having perception about the questioned data.

Cases	Gender	Age (years)	Language development hystory *	Pre-, peri- or post-natal complications*	Hearing	Orofacial Myology (structures and functions)
Subject 1	Female	5	Babbling at 9 months; First words at 10 months; Basic sentences at 12 months; Complex sentences after 12 months; Hability to tell facts at 24 months.	Absent.	Normal	Without structural or functional abnormalities.
Subject 2	Female	6	First words at 12 months.	Absent.	Normal	Without structural or functional abnormalities.
Subject 3	Female	8	First words at 12 months.	Absent.	Normal	Without structural or functional abnormalities.
Subject 4	Male	5	Referred delay in language acquisition and development, although informant could not describe the process.	Mother emotional problems during pregnancy.	Normal	Without structural or functional abnormalities.
Subject 5	Male	7	First words at 12 months.	Absent.	Normal	Without structural or functional abnormalities.
Subject 6	Male	5	Informant could not describe linguistic development but reported normality of the process.	Umbilical cord “around the neck”.	Normal	Without structural or functional abnormalities.
Subject 7	Male	5	Informant could not describe linguistic development but reported normality of the process.	Absent.	Normal	Without structural or functional abnormalities.
Subject 8	Male	6	Babbling at 3 months; Vocalizations at 7 months; First words at 9 months.	Forceps delivery	Normal	Without structural or functional abnormalities.
Subject 9	Male	5	First words at 12 months; Ability to tell facts at 30 months.	Absent.	Normal	Without structural or functional abnormalities.
Subject 10	Female	5	Babbling at 3 months; First words at 8 months; Ability to tell facts at 24 months.	Forceps delivery	Normal	Without structural or functional abnormalities.
Subject 11	Male	7	First words at 16 months.	Mother emotional problems during pregnancy.	Normal	Without structural or functional abnormalities.
Subject 12	Male	5	Babbling at 12 months; First words at 36 months; Basic sentences at 42 months; Complex sentences after 48 months.	Mother emotional problems during pregnancy; Maternal hypertension during pregnancy; Prolonged labor; Forceps delivery.	Normal	Without structural or functional abnormalities.

Note – * Information collected during the first session of the patient in the Teaching Clinic at the time of initial evaluation, as of the record charts. The lack of some information, as well as the heterogeneity in the form of presentation of these data, are due to the report inconsistency of guardians/informants.

Figure 1 – Information on language development history, hearing and orofacial myology aspects of each case studied

Parents or guardians voluntarily agreed to their participation in the study and signed the Informed Consent Form (ICF). The study was approved by the Research Ethics Committee of Universidade Estadual do Centro-Oeste UNICENTRO, under the number 13465/2008.

Initially, children went through a complete speech-language evaluation, in order to overt criteria for inclusion and exclusion in the research. The inclusion criteria for the diagnosis of phonological disorder and hence participation in the study were: normal hearing, absence of orofacial myofunctional disorders and absence of other language impairments that were related to aspects of content and function. It was adopted as exclusion criteria: less than 5 years and above age 8; abnormalities, either anatomical or physiological of speech production mechanisms and; presence of neurological dysfunction relevant to speech production. All subjects underwent evaluation of following aspects: audiological (audiometry and acoustic immittance), orofacial myofunctional (structural and functional aspects) and language (form, content and function).

Therefore, there were 12 children who met the conditions mentioned above on the waiting list. Then the initial phonological assessment, performed through the ABFW Child Language Testing – Phonology[13], to scan the types and quantity of phonological processes.

Regarding the therapeutic process, all children were treated with the same diagnosis and intervention strategies. The children were treated in the period of March to June 2009 and from August to November of the same year (July was school holidays in the clinic). All cases were treated by the same therapist (student/intern) and supervised by the same professor in the Department of Speech Pathology with expertise in the area of phonological disorders. A supervision session was performed after each intervention. All procedures were recorded in reports that make up the medical charts of children.

Thus, all collected data in this research were obtained from Speech Language Pathology charts of this teaching clinic, following a protocol with specific collecting items. It was emphasized characterization and distribution of age and gender sample and investigation of number and type of the persistent phonological processes in the child speech.

It was stipulated previously, a number of 32 sessions, divided in four intervention modules of eight sessions each. At the end of each module a phonological assessment was performed, in a total of 4 assessments (initial, after 8 sessions, after 16 sessions, after 24 sessions and after 32 sessions). All evaluations followed the same procedures. The sessions were weekly, lasting approximately 40 minutes each. Some children were discharged before the period of 32 sessions.

The therapeutic process was based on PROMPT (Prompts for Restructuring Oral Muscular Phonetic Targets Phonological Contrast)[14] and Contrastive[15], as so during the therapy, activities focused the use of alerts to indicate to children the phonological contrasts of phonetic targets, as well as orofacial myology adjustments to restructure these targets. The focus of therapy was based on these two models, due to the individual differences of the subjects and especially because there is not an approach that benefits all subjects uniformly. Moreover, approaches generally have similar work strategies, differing by the method of selecting the target sounds to be worked and the way they are presented to the subject being treated.

PROMPT[14] model is based on the control and programming of motor movements, using isolated phonemes and vocabulary from tactile and kinesthetic cues. Thus, the emphasis refers to the articulation point of the target sound as well as its production. Then isolated phonemes are selected and worked on, based on those which are interfering the most with speech intelligibility of the child. Contrastive[15] model selects target sounds, from their minimal pairs based on those that are also interfering negatively in speech intelligibility of the child.

The data collected in the evaluations were tabulated and analyzed using descriptive statistics (gender, age, persistent phonological processes in the children's speech and mistaken phonemes). In addition, paired T Student test was used to check the differences between the results of the first and last phonological assessment of each child (therapeutic evolution and effectiveness of the process). Results were considered significant at the 95% level of significance or 0.05.

RESULTS

The data collected in the first assessment characterize the studied cases. The data related to gender indicates a predominance of males (n = 8; 66.7%) compared to females (n = 4; 33.3%). Regarding age, patients ranged between 5 and 8 years of age, with an average of 6.08 years (SD = 1.165).

As for the characterization of the frequency of persistent phonological processes in the speech of the subjects during the initial evaluation, 100% of participants (n = 12) showed consonant cluster simplification. 8 children had liquid simplification and final consonant simplification. It is noteworthy that none of the participants showed persistence of stop sound and fricative voicing and fricative devoicing.

Table 1 – Characterization and frequency of persistent processes in speech of subjects in initial assessment

Phonological Processes	Absolute Frequency[1] (n)	Relative Frequency (%)
Syllable reduction	0	0
Harmony	2	4,347
Stopping	4	8,695
Velar fronting	0	0
Velar backing	0	0
Palatal backing	4	8,695
Palatal fronting	3	6,521
Liquid simplification	8	17,391
Consonantal cluster simplification	12	26,086
Final consonant simplification	8	17,391
Stop sound voicing	0	0
Fricative voicing	0	0
Stop sound devoicing	3	6,521
Fricative devoicing	0	0
Others	2	4,347
Total	46	100%

[1] Possibility of showing more than one process; Descriptive statistics

The results also indicated which types of phonemic mistakes were seen at the first assessment of the children. The most frequent error occurred with the phoneme /l/ in consonant cluster, seen in 10 out of 12 participants. Secondly there was the error of the phoneme /r/ in consonant cluster, present in 9 participants.

Table 2 – Characterization and frequency of mistaken phonemes in speech of subjects in initial assessment

Categories	Absolute Frequency[1] (n)	Relative Frequency (%)
/l/ consonantal cluster	10	16
/r/ consonantal cluster	9	14
/ʎ/	6	9
Intervocalic /r/	6	9
Archiphoneme /R/	6	9
/ʒ/	4	6
/g/	4	6
/z/	4	6
/s/	3	4
/b/	3	4
/k/	2	3
/ʃ/	2	3
/v/	2	3
/l/	2	3
/d/	1	1
/t/	1	1
/f/	1	1
Archiphoneme /S/	1	1
/p/	1	1
Total	68	100

[1] Possibility of showing more than one process; Descriptive statistics

Regarding the average number of mistaken phonemes and phonological processes in four evaluations, we could observe a significant decrease of both during the process (comparison between the first and fourth evaluation). The average number of phonological processes decreased from 5.67 to 0.75 and the mistaken phonemes from 3.83 to 0.75. There were significant differences in both comparisons (p = 0.000), indicating efficacy of speech therapy regarding the reduction of phoneme errors and, consequently, persistent processes.

Table 3 – Comparison between the average number of mistaken phonemes and persistent processes between the four assessments

Quantity of mistaken phonemes						
Assessment	**Subjects**	**Minimum**	**Maximum**	**Average**	**Standard Deviation**	**p-value**
1	12	1	11	5,67*	3,143	0,000*
2	12	0	10	4,33	3,42	
3	12	0	9	3,5	3,177	
4	12	0	4	0,75*	1,357	
Quantity of persistent phonological processes						
Assessment	**Subjects**	**Minimum**	**Maximum**	**Average**	**Standard Deviation**	**p-value**
1	12	1	7	3,83*	1,946	0,000*
2	12	0	8	3,42	2,644	
3	12	0	6	2,5	2,195	
4	12	0	4	0,75*	1,357	

* Test t Student; p<0,05

Table 4 – Speech therapy outcome after fourth assessment

Outcome	Absolute Frequency[1] (n)	Relative Frequency (%)	Average	Standard Deviation
Discharged	5	42	5,67	3,143
Remained in therapy	4	33	4,33	3,42
Discontinued	2	17	3,5	3,177
Dropped out	1	8	0,75	1,357
Total	12	100		

[1] Possibility of showing more than one process; Descriptive statistics

Finally, Table 4 indicates the outcome of each child after the end of the study. Five children had speech therapy discharge during this period, four patients remained in treatment, two were discontinued due to consecutive and unexcused absences and one dropped out of the service because parents believed that the child had improved and could continue developing on their own.

DISCUSSION

Regarding the characterization of the sample, the results indicated a predominance of males. These findings corroborate several previous studies, which concluded that the number of children who have speech disorders is higher in boys[16-18].

Considering age, five children were five years old and the mean age was six years, similar to results of other studies[18-20]. Therefore, these results indicate that younger children have come to the clinic with speech complains, expressing parents concern already in the preschool years. It is believed that this early demand can be related to the presence of Speech Language Pathology Programs and Teaching Clinic in the city where the study was conducted, with consequent implementation of several preventive actions within the general population.

Given the importance of early diagnosis and intervention in cases of phonological disorders[9-10], it is believed that most children in this study were assisted in a priviledged age, the preschool years. A prevalence study, conducted with seven year-old students, investigating phonological aspects, found a large number of students who still have persistent processes at this age and point to the need of early intervention programs with this group[21].

Although the close relationship between oral and written languages is already known[22], a study sought to analyze specifically the performance of reading and writing skills of students with phonological disorders[23]. The authors concluded that the phonological errors present in speech influence directly on the acquisition of reading and writing, and consequently school performance of children.

The results indicated that the most common phonological processes were consonant cluster simplification, liquid simplification and final consonant simplification, corroborating findings from previous research. Studies indicate that the last processes to be eliminated in the child's speech are consonant cluster simplification[16,24]. Another study points out other processes commonly found in children with phonological disorders, such as fricatives and stop sounds devoicing[24]. Such processes had a small incidence in the group analyzed here, which allows the inference that "less serious" cases also come to speech therapy clinic, by parents and/or guardians demand.

Regarding the therapeutic outcome, there was a reduction in the average number of both mistaken phonemes and persistent processes, when comparing the first and last assessment. There are few studies involving the effectiveness of certain types of therapeutic processes . A recent study investigated the therapeutic outcomes of children with phonological disorders, subjected to two models of speech therapy for the acquisition of "r" sounds[25]. One of the children was treated by the model ABAB – Withdrawal and Multiple Probes and the other with the Maximal Oppositions Model. The authors concluded that the proposed program of treatment did not allow the acquisition of sounds itself, although favoring different types of generalization. Although with very different approaches and proposals, data above[25] differ from the results of this study, as here was found statistically significant difference between the first and last assessment of the therapeutic process, indicating that there was phonemic automation and reducing the amount of persistent phonological processes.

For cases that were not discharged after the therapeutic process of 32 sessions, it should be considered that certain factors were not controlled during this process. One study points out, for example, that the maintenance of phonological

disorder can be sustained by the environment[12]. Therefore, it is important to highlight the possibilities of phonological production of interlocutors, and the demand of the family. In the therapeutic process developed in the present study, parents and family were not involved directly, through specific sessions, moments of reflections and discussions with the therapist. It is emphasized here the importance of considering in future researches, the introduction of exclusive sessions with relatives, involving them in the therapeutic process. It is possible that such inclusion promotes a smaller number of dropouts and dismissals during the treatment period.

As for the satisfactory results regarding the therapeutic outcome in this study, it should be noted the importance of early treatment[9,10], which may have been critical as most of the children were still in preschool years. For the elucidation of this issue it is suggested that further studies try to relate, in a controlled format, the therapeutic outcome to the age of children. Thus, to obtain reliable data about the importance of early intervention in cases of phonological disorders.

A recent study, which included an extensive review of the literature of phonological disorder treatments[1,] concluded that there are several methods and approaches used for this purpose and that, regardless of what they are, children can be benefited by the therapy. Still, according to the study, the diversity of results and propositions in the therapeutic process showed that the therapist should be aware that each child responds differently to the various approaches, being caution necessary during therapy.

Corroborating the aforementioned literature review, the literature on the effectiveness of different therapy models is vast, including nacionally[6,9,26-30]. In general, studies indicate significant therapeutic developments, regardless of the method used. So, the therapist's role is crucial in the process, as it is he/her who will structure and have sensitivity to choose the best course of treatment for each their patients. Therefore, all methods and approaches can be either effective or not, depending, apart from factors that are beyond the scope of clinical management, on perception and professional maturity of the therapist.

In this study's therapeutic process, an association was made between Contrastive approach[14] and PROMPT Method[15] (control and programming of motor movements), because it is believed that both work with fundamental aspects of phonological restructuring by the patient. Specifically using the contrastive approach and PROMPT method in the therapeutic process of children with speech disorders, an international study compared the clinical outcomes of children with this type of disorder that were subjected to different types of treatament[15]. The authors compared the efficacy of these approaches in the therapeutic of three children with phonological disorders. All children were treated with the two methods and a approach focusing on vocabulary. In conclusion, it was mentioned that all models generate significant improvements in speech intelligibility of children. Moreover, each method is best handled depending on the each case: children with repair strategies common in phonological development, for example, are more benefited by the contrastive approach, whereas children with inconsistent repair strategies outperform using the model focused on vocabulary. The study also emphasizes that results indicate that there is not one specific model to be used in the treatment of all cases of phonological disorders.

FINAL CONSIDERATIONS

The present study found very similar characterization data sample to other studies in the field. This indicates that the inferences made here have grounding in literature and lead to reflections and generalizations when considering the therapeutic process of children with phonological disorders. It also confirmed that the speech therapy in this group is effective and relatively quick, which is a very important aspect when thinking about preventive and health promotion practices.

The obtained data showed the aspects that may have been essential for children to have a significant outcome during speech therapy were: the combination of different therapeutic models during the process, early intervention, and the linearity of the perception of one and the same therapist and supervisor/teacher. Future research with a larger number of subjects and the controlled variables, such as age, medical history, family involvement in the process, types of models used and education/training of therapists can contribute to clarify these aspects and, consequently, to outline better actions in speech-language activities for children with phonological disorders .

It can be stated that this research has fulfilled its role fully, as it answered questions, met the demand of a specific population and allowed the reflections on speech therapy for phonological disorders. It is expected to have contributed to the guide of clinical practice and for the validation of new academic experiences on the subject .

RESUMO

Este estudo buscou investigar os dados de evolução terapêutica de um grupo de crianças com desvio fonológico. Objetivou-se caracterizar a demanda dos sujeitos atendidos em uma clínica-escola de Fonoaudiologia, no período de março a setembro de 2009. Essa caracterização priorizou: gênero, idade, número de sessões realizadas, quantidade e tipo de processos fonológicos apresentados ao início e ao final da coleta, e conduta. Participaram da pesquisa 12 crianças, de ambos os gêneros, com idades entre cinco e oito anos, que passaram por acompanhamento individual, subsidiados pelas abordagens PROMPT e Constrastiva. Foram aplicadas quatro avaliações fonológicas com intervalo de dois meses entre elas, sendo uma inicial, duas intermediárias e uma final. Nas avaliações, as crianças deveriam nomear 34 figuras que representavam vocábulos contendo todas as possibilidades fonêmicas do português. Foram realizadas a análise fonológica tradicional e a verificação dos processos fonológicos correspondentes. Os resultados indicaram o predomínio do gênero masculino e a média de idade foi de seis anos. Os processos fonológicos mais comuns na primeira avaliação foram redução de encontro consonantal, simplificação de líquida e simplificação de consoante final. Observou-se diminuição da quantidade média de processos fonológicos quando comparadas à primeira e à última avaliação. Quanto à conduta, cinco crianças receberam alta, quatro permaneceram em tratamento, após a quarta avaliação e três foram desligadas. Foi possível concluir que a atuação fonoaudiológica individual junto às crianças, tendo como base as abordagens PROMPT e Contrastiva, proporcionou evolução significativa no que se refere ao desvio fonológico.

DESCRITORES: Linguagem Infantil; Patologia da Fala e Linguagem; Fonoterapia

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