



# Speech summer camp for treating articulation disorders in cleft palate patients

Carmen Pamplona, Antonio Ysunza\*, Carmeluza Patiño, Elena Ramírez, Mónica Drucker, Juan J. Mazón

Cleft Palate Clinic, Hospital Gea González, 4800 Calzada Tlalpan, México City D.F. 14000, Mexico

Received 12 May 2004; received in revised form 18 October 2004; accepted 19 October 2004

## KEYWORDS

Cleft palate;  
Speech;  
Therapy;  
Articulation;  
Velopharyngeal  
insufficiency

## Summary

**Introduction:** Compensatory articulation disorder (CAD) severely affects speech intelligibility of cleft palate children. CAD must be treated with speech therapy. Children can manage articulation better when they use language in event contexts such as every day routines.

**Objective:** The purpose of this paper is to study and compare two modalities of speech intervention in cleft palate children with associated CAD. The first modality is a conventional approach providing speech therapy in 1-h sessions, twice a week. The second modality is a speech summer camp in which children received therapy 4 h per day, 5 days a week for a period of 3 weeks. We were aimed to determine if a speech summer camp could significantly enhance articulation in CP children with CAD.

**Materials and methods:** Forty-five children with repaired cleft palates who exhibited CAD were studied. A matched control group of 45 children with repaired cleft palate who also exhibited CAD were identified. The patients included in the first group attended a speech summer camp for 3 weeks. The matched control subjects included in the second group received speech therapy aimed to correct CAD twice per-week in 1-h sessions.

**Results:** At the onset of either the summer camp or the speech therapy period, the severity of CAD was evenly distributed with non-significant differences across both groups of patients ( $p > 0.05$ ). After the summer camp (3 weeks) or 12 months of speech therapy sessions at a frequency of twice per-week, both groups of patients showed a significant decrease in the severity of their CAD ( $p < 0.05$ ). However, when the distribution of the severity of CAD was compared at the end of the summer camp or the speech therapy period, non-significant differences were found between both groups of patients ( $p > 0.05$ ).

**Conclusions:** A speech summer camp is a valid and efficient method for providing speech therapy in cleft palate children with compensatory articulation disorder.

© 2004 Elsevier Ireland Ltd. All rights reserved.

\* Corresponding author. Fax: +52 55 5568 5086.

E-mail address: amysunza@terra.com.mx (A. Ysunza).

## 1. Introduction

Speech development is influenced by the activities in which children participate and learn to communicate with their peers and the significant adults around them. Children and adults are involved in predictable daily routines and enhance their communications skills in these contexts. Children add to and refine their communications becoming more conventional and intentional. Thus, speech development is influenced by the quantity and quality of the social interactions in which the child participate [1–4].

Cleft palate (CP) children with articulation disorder usually have deviant speech development. They initiate communications less frequently and do not add to or elaborate on a topic during conversation. Hence, a negative communication interaction pattern may develop [5,6].

We have reported previously that cleft palate patients accompanied by their mothers during speech therapy sessions had significantly better language skills [7,8]. We have also reported that the mothers who become active participants during speech intervention improve their communicative style and mode of interaction, enhancing speech development in cleft palate children [9].

Speech outcome in cleft palate patients depends on articulation and nasal resonance. Certain articulation disorders are generally regarded as compensatory behaviors secondary to velopharyngeal insufficiency (VPI). These articulation errors include dysfunction not only of the velopharyngeal sphincter (VPS), but of the entire vocal tract [10]. For example, plosive sounds such as /p/ or /k/ might be attempted by substituting a glottal stop. These anomalous articulation patterns are usually referred as compensatory articulation disorder (CAD). This disorder severely decreases intelligibility and usually requires a very prolonged period of speech therapy [3,11,12].

A phonetic disorder occurs when the movements of the articulators, such as the lips, tongue, palate or resonating cavities are altered from a normal or typical production. Thus, a compensation such as a glottal stop production would be considered phonetic, as the child with VPI is attempting to produce the sound in an alternative manner to compensate for the inability to establish oral pressure because of the CP. Because the glottal production reflects an obvious and productive compensation, this disorder have been viewed as phonetic and articulation becomes the main topic in intervention. However, only a moderate percentage of children with CP exhibit CAD. Furthermore, it has been reported that only a small percentage of children continue to

produce CAD despite the early and effective repair of the cleft. This finding suggest that some other factor other than the inability to establish sufficient oral air pressure is contributing to the development and maintenance of these articulatory patterns [3,13].

Three reports have provided evidence that CAD is a phonological disorder rather than phonetic. Chapman in 1993 [14] reported phonological analysis in CP children. Her findings indicated that children with CP produced the same types of phonological process errors as younger typically developing children.

In the second study, Pamplona et al. [15] treated children with CAD following surgery in either a phonetic or a phonological treatment approach. They found that addressing the phonological rules resulted in faster learning of the target productions and more rapid incorporation into the language rules and thus more immediate carryover into conversational speech.

Finally, Ysunza, Pamplona and co-workers [3] reported that cleft palate patients present with CAD demonstrated a significantly higher frequency of delay in language development as compared with CP children present with VPI without CAD. They concluded that CAD should be considered as a phonological disorder, that is, linguistically based and more related to higher levels of linguistic organization (rule level) rather than phonetic (cognitive peripheral level).

If CAD is considered as a phonological disorder, then speech intervention in these cases should address not only the articulation process but also aspects of linguistic organization. It is important to emphasize that in order to address the linguistic system of each child, one has to consider the speech sound production as an integral component of higher levels of language organization. Thus, there appears to be a significant interaction between CAD and higher levels of linguistic organization. It has been reported that children can manage articulation better when they use language in the context of events such as every day routines. As they learn the rules, actions and objects associated with the events, they map words to the visual event. These words include many levels and descriptions of the ongoing actions and related objects. Once the words are integrated with the event, they serve to add complexity and abstraction to the internal event structure. That is, the event structures have to be present to provide a context for mapping language [4].

For mapping language, CP children with CAD would map the standard speech produced by others within the events. The phonological rule system thus would be modified consistent with this adult input.

CP children with fewer or more impoverished event structures usually continue with CAD for a longer period of time. Compensatory productions lack a meaningful context for change and therefore become overlearned motor patterns. As event structures and the concomitant language are enhanced, these learned productions are incorporated into the phonological system.

CP children with CAD are better served using phonologically based treatment approaches. By modifying the child's internalized rules governing production, the child's speech changes to match this revised category. Since phonological rules are integrated with other linguistic aspects, occurrence of correct sounds in spontaneous production is more rapid. The sound does not first have to be learned as a motor production and then generalized to spontaneous speech. Therefore, naturalistic contexts that allow for event structures and related language have been recommended for the speech intervention in CP children with CAD [16].

Naturalistic contexts seem to be best provided in the form of play and story telling. These experiences seem to be more effective when they are received on a daily basis and for prolonged periods of time. Thus, an option for a better speech intervention in CP children with CAD, appears to be a carefully planned sequence of every-day activities emphasizing appropriate articulation within specific linguistic contexts. These activities could be included in a speech summer camp program for CP children.

The purpose of this paper is to study and compare two modalities of speech intervention in cleft palate children with associated CAD. The first modality is a conventional approach providing speech therapy in 1-h sessions, twice a week. The second modality is a speech summer camp in which children received therapy 4 h per day, 5 days a week for a period of 3 weeks. We were aimed to determine if a speech summer camp could significantly enhance articulation in CP children with CAD.

## 2. Materials and methods

Sample size was calculated at an Alfa of 95% confidence interval and a Beta power of 80% for a comparative study of two groups. The frequency of CAD in CP children, the distribution of the degrees of severity of CAD and the mean period of time of speech therapy necessary for correcting CAD in our CP children during the previous years were considered. We were aimed to detect a difference greater than 25% between the two groups.

The experimental subjects of this study were 45 children with repaired cleft palates who exhibited

CAD. Subjects were between the ages of 3 and 10 years when they were recruited for the study. A matched control group of 45 children with repaired cleft palate who also exhibited CAD were identified. Both groups of subjects were recruited from patients who were evaluated in the cleft palate clinic of the Hospital Gea Gonzalez at Mexico City from January 2002 to May 2003. To qualify for the experimental group for this paper, the patients had to meet the following criteria:

- (1) Unilateral, complete cleft of primary and secondary palate (UCLP) [17].
- (2) No known neurological or genetic syndromes.
- (3) No identified severe language disorders according to the SDS-model evaluation practiced in our clinic routinely and reported previously [3].
- (4) Cleft palate width had to be degrees I or II [18].
- (5) Palatal repair of the UCLP performed according to the surgical routine of the cleft palate clinic. This routine includes: surgical repair of the lip and primary palate between 1 and 3 months and surgical repair of the secondary palate between 4 and 8 months with a minimal incision palatopharyngoplasty [13].
- (6) VPI after palatal repair demonstrated by phoniatric clinical assessment, videonasopharyngoscopy and multi-view videofluoroscopy.
- (7) CAD in association with VPI demonstrated by phoniatric clinical assessment during isolated and connected speech [11,19].
- (8) Absence of postoperative fistulae.
- (9) Chronological age between 3 and 10 years of age at the time of selection for the study.
- (10) Normal hearing demonstrated by conventional pure-tone audiometry.

Two types of CAD productions were exhibited by subjects in this study. The first, glottal stop occurs when plosive sounds requiring intraoral air pressure are produced instead by stopping and releasing air pressure at the level of the glottis. The second, pharyngeal fricative occurs when the placement of the friction is produced by the tongue and posterior pharyngeal wall instead of the oral cavity [10,20–22].

Forty-five patients who met the criteria comprised the experimental group. A control group composed of children with CP with VPI and CAD, matched for dimensions such as age, gender, age of repair of the secondary palate, age of tympanostomy tubes, educational level and social–economical status were selected from the clinical population.

To determine if the groups were equivalent, Student's *t*-tests were run for the following para-

metric variables: chronological age (mean age = 68.95 months for the experimental group; mean age = 70.02 months for the control group), age of repair of the secondary palate (minimal incision palatopharyngoplasty; mean age = 5.50 months for the experimental group; mean age = 5.15 months for the control group) and age of tympanostomy tubes (mean age = 12.45 months for the experimental group; mean age = 12.75 months for the control group). Additionally, Wilcoxon signed-ranked test were run for the ordinal variables: educational level and socio-economical status.

Results indicated that no significant group differences were found for any of these variables.

The protocol was approved by the Bioethics and Research Committees of the Hospital Gea Gonzalez. Before the inclusion of each patient into the study group, the parents or legal guardians were carefully explained about all the procedures and the methodology of the protocol. It should be stressed that in every case, the parents or legal guardians were assured that their children were going to receive the best clinical care (speech therapy in this case) possible, regardless of their inclusion into the summer camp group or the control group. All parents or legal guardians of the patients included in both groups (summer camp and control groups) agreed to participate in the study.

The patients included in the first group attended a speech summer camp for 3 weeks. Twenty-five patients were included in the summer camp of 2002, whereas 20 patients were included in the summer camp of 2003. These patients received speech intervention for 4 h a day, from Monday to Friday. The mothers of these patients also attended the summer camp. During the day, several activities were planned for the speech intervention. All activities were designed to maximize opportunities for articulation in a naturalistic environment, always within a linguistic context. In these activities, general phonological principles and the whole language model were considered. Whole language philosophy considers language as a whole and not a sum of parts that can be treated separately [23]. Content, function and form, which includes the phonologic information, should be treated simultaneously in a whole-to-part manner. Following that assumption, the activities were designed around one topic. There were no separate teaching times that focused exclusively on articulation, reading or writing. Rather, a single meaningful writing activity integrated all of the working areas as the children explore, talk, read, write about or illustrate a topic [24].

A general topic was selected for the summer camp. All the activities of the camp were designed

around this topic. For example, in the first summer camp, the topic was “the circus”. Several story books about the circus, in different levels were selected in order to fit the necessities of all the groups of children. All the groups played, read, analyzed and discussed the different materials. All the children attended a circus show where photographs were taken. These photographs provided each child the context for writing or illustrating (depending on the development of each child) a short book about their experience in the circus and for performing a circus show for their peers and parents. This event was planned, organized and performed by the children. Other activities were planned, for example, the “circus store”, where children made all the items necessary for establishing a “real” store. The children organized, made money, assigned prices, bought and sold different candies and other meals. The store items had the fricatives and plosive phonemes, which are difficult to produce in children with cleft palate and associated compensatory articulation.

These situations gave the perfect context for working all the language areas in a parallel manner. Oral language, articulation, reading and writing were presented in natural context from whole-to-part.

The matched control subjects included in the second group received speech therapy aimed to correct CAD. These patients received therapy twice per-week in 1-h sessions. Phonological principles and the whole-language model were used for the speech intervention as reported previously [16]. Children were placed in small groups accompanied by their mothers in order to provide opportunities for interaction and socialization. Only two or three children were placed in one group to maximize individual opportunities for adult modeling and other intervention prompts.

To determine if there were differences in the articulation between children from group 1 to group 2, speech samples were elicited from both groups. The samples were obtained under two naturalistic conditions, play and story telling. The samples were collected during two different sessions within a 1-week period. All interactions were video recorded for later transcription and analysis.

For the story telling condition, each child met individually with one of the three trained examiners for approximately 30 min of story time. Stories were elicited from one of two sources. All children were shown an action picture showing a family engaged in everyday activities such as cooking, playing hide-and-seek, and doing laundry, selected from a picture set. The activities and objects including selected plosive and fricative phonemes were high-

lighted for the children. Children were asked to look at the picture and tell a story. They were encouraged to tell more if they did not talk about many events of the picture and were given question prompts to help elicit more complex information or details. Next, the examiner modeled a standard story about the picture that provided interpretations of the actions of the characters, especially those including words with selected phonemes. This model included more complex ideas and better story organization than those produced spontaneously by children. Children were then asked to retell the modeled story from the pictures. Both the spontaneous story and the retelling were analyzed.

In the case of the youngest subjects, this story was too difficult and failed to elicit sufficient language production for analysis. In this case, a second story telling was elicited using an illustrated story book about bathtime, which told a boy getting ready for bed and taking a bath, but making a mess at every step of the process. Once again the procedure of eliciting a spontaneous telling, question prompts and modeling followed by retelling was used.

For the play condition, each child met individually with the same examiner as in the story telling condition for 30 min on a second day. A miniature play house with a side array of people, furniture, food items. And other props were available. The child was first allowed to play spontaneously, while the examiner asked questions about the actions. The examiner also modeled play actions when needed by the young children and then encouraged the child to try the action and talk to and for the characters. Again, words, which included selected phonemes, were given special attention during the play condition.

All videotaped interactions were transcribed verbatim, including the conversational turns of the examiner and the child. Three examiners transcribed the samples, which were randomly assigned to an examiner. Each transcription was then checked against the videotape by a researcher that had not done the original transcription along with a second examiner for accuracy. If either of these two judges differed from the transcription, the videotape was analyzed again until consensus was reached. All videotapes for all children were verified for accuracy in this manner.

The control subjects included in group 2 were followed for a period of 12 months. These children were evaluated before the onset of speech therapy and after the follow-up period.

The patients included in group 1, attending the speech summer camp were evaluated before and after the summer camp.

The following variables from both groups were compared: the frequency of children who comple-

tely eliminated CAD during the production of words. The frequency of children who completely eliminated CAD during spontaneous conversational speech. The severity of CAD in both groups of children. This variable was classified according to a scale including: normal. This category was considered when no compensatory articulation errors during the production of a speech sample routinely used in our clinic for the last 10 years, which has been reported previously [22,25], the patients classified in this category had already corrected placement and manner of articulation during spontaneous conversational-connected speech; mild. A mild CAD was considered as the condition in which compensatory articulation errors occurred in 20% or less during the production of the speech sample and the patients produced compensatory articulation inconsistently during spontaneous conversational-connected speech. These patients were able to correct articulation completely when they produced emissions within a familiar linguistic context; moderate. This category was considered when compensatory articulation errors occurred more than 20% but less than 75% during the production of the speech sample. These patients were able to correct articulation with specific modeling by the speech pathologist. Finally, a severe CAD was considered when the child presented more than 75% of articulation errors during the speech sample; these patients were able to correct articulation only during isolated phonemes. These variables were compared using a chi-square test or a Fisher exact test [26,27].

An alpha value of  $<0.05$  was selected for considering the differences between the variables as stochastically significant [28].

### 3. Results

At the onset of the summer camp or the speech therapy sessions, according with the inclusion criteria, all the patients included in the two study groups (experimental and control groups) showed compensatory articulations. In other words, none of the patients included in this study were classified as normal in the CAD scale used for this paper. From the patients included in the experimental group (attending the summer camp), five patients (11%) were present with mild CAD. Seventeen patients (38%) showed moderate CAD. Finally, 23 patients (51%) showed severe CAD. The patients included in the control group showed similar results. Seven patients (15%) showed mild CAD. Fourteen patients (31%) showed moderate CAD. The remaining 24 patients (54%) showed severe CAD. A Fisher exact test demonstrated that there was a non-significant

**Table 1** Compensatory articulation disorder (CAD)

Articulation	Active group (group 1)	Control group (group 2)	Total
Normal	0 (0)	0 (0)	0
Mild CAD	5 (11)	7 (15)	12
Moderate CAD	17 (38)	14 (31)	31
Severe CAD	23 (51)	24 (54)	47
Total	45 (100)	45 (100)	90

$p > 0.05$ . Severity of compensatory articulation at the onset of the summer camp (active group) or conventional speech therapy sessions (control group). Severity of compensatory articulation was similar in both groups of patients. Values in parenthesis are in percent.

difference ( $p > 0.05$ ) between the distribution of the severity of CAD in both groups of patients (see Table 1).

After the summer camp, 10 patients (22%) from the experimental group completely corrected compensatory articulation. Twenty-three patients (51%) showed mild CAD. Ten patients (22%) showed moderate CAD. Finally, two patients (5%) persisted with severe CAD. A chi-square test demonstrated that the patients from the experimental group showed a significant ( $p < 0.05$ ) decrease in the severity of CAD after the summer camp (see Table 2).

After 12 months of speech therapy, seven patients (15%) from the control group completely corrected compensatory articulation. Fourteen patients (31%) showed mild CAD. Twenty patients (45%) showed moderate CAD. Finally, four patients (9%) persisted with severe CAD. A chi-square test demonstrated that also the patients from the control group showed a significant ( $p < 0.05$ ) decrease in the severity of CAD after 12 months of speech therapy (see Table 3).

At the end of the summer camp (3 weeks) or the speech therapy (12 months), the severity of CAD in both groups of patients was compared. A chi-square test demonstrated similar degrees of severity in both groups of patients ( $p > 0.10$ ) (see Table 4).

**Table 2** Compensatory articulation disorder (CAD) active group (summer camp) (group 1)

Articulation	At onset (A)	At end (B)	Total
Normal	0 (0)	10 (22)	10
Mild CAD	5 (11)	23 (51)	28
Moderate CAD	17 (38)	10 (22)	37
Severe CAD	23 (51)	2 (5)	25
Total	45 (100)	45 (100)	90

$p < 0.05$ . Severity of compensatory articulation at the onset (A) and at the end (B) of the summer camp in the patients from the active group (group 1). There was a significant decrease in the severity of compensatory articulation at the end of the summer camp. Values in parenthesis are in percent.

**Table 3** Compensatory articulation disorder (CAD) control group (conventional speech therapy for 12 months) (group 2)

Articulation	At onset (A)	At end (B)	Total
Normal	0 (0)	7 (15)	7
Mild CAD	7 (15)	14 (31)	21
Moderate CAD	14 (31)	20 (45)	34
Severe CAD	24 (54)	4 (9)	28
Total	45 (100)	45 (100)	90

$p < 0.05$ . Severity of compensatory articulation at the onset (A) and at the end (B) of 12 months of speech therapy sessions, twice per-week, in the patients from the control group (group 2). There was a significant decrease in the severity of compensatory articulation at the end of the speech therapy period. Values in parenthesis are in percent.

**Table 4** Compensatory articulation disorder (CAD)

Articulation	Active group (group 1)	Control group (group 2)	Total
Normal	10 (22)	7 (15)	17
Mild CAD	23 (51)	14 (31)	37
Moderate CAD	10 (22)	20 (45)	30
Severe CAD	2 (5)	4 (9)	6
Total	45 (100)	45 (100)	90

$p > 0.05$ . Severity of compensatory articulation at the end of the summer camp (active group; group 1) and conventional speech therapy sessions (control group; group 2). Severity of compensatory articulation was similar in both groups of patients. Values in parenthesis are in percent.

#### 4. Discussion

From the results of this study, it is evident that cleft palate patients with CAD, showed similar decreases in the severity of the CAD after attending either a speech summer camp for 3 weeks, or receiving speech therapy twice a week for a period of 12 months.

All the cleft palate patients included in the study groups for this paper, showed CAD with diverse degrees of severity.

At the onset of either the summer camp or the speech therapy period, the severity of CAD was evenly distributed with non-significant differences across both groups of patients. In other words, both groups of patients were quite homogeneous and therefore comparable.

This homogeneity can be explained by the strict inclusion criteria used for this paper.

After the summer camp or 12 months of speech therapy sessions at a frequency of twice per-week, both groups of patients showed a significant decrease in the severity of their CAD.

Furthermore, 10 (22%) patients attending the summer camp and 7 (15%) of the patients receiving

speech therapy twice a week, were able to completely correct CAD and were able to produce normal speech during spontaneous conversational-connected emissions.

However, when the distribution of the severity of CAD was compared at the end of the summer camp or the speech therapy period, non-significant differences were found between both groups of patients.

It should be pointed out that although both methods of therapy were based upon the same principles (phonological principles, naturalistic and whole-language approaches), they were obviously quite different. Besides the difference in total time (3 weeks versus 12 months). During the summer camp there were a number of activities enhancing speech production that seemed more attractive for the children. At the summer camp site, the patients and their parents were participating in several activities for a 4-h span. In contrast, the children receiving speech therapy, were participating in a planned activity with a couple of their peers, two speech pathologists and their parents, only for 1-h sessions twice per-week.

It is important to emphasize that in order to comprehend the linguistic system of each child we have to consider the speech sound production as an integral component of higher levels of language organization such as pragmatic, syntactic and semantic knowledge. It has been described that children's speech sound production and perception errors are related not only to phonological knowledge but also to higher organizational levels of language processing [29].

Whole language philosophy considers phonology as an integral component of language. Intervention should address speech sound production in significant and relevant events.

Hence, even though the correction of the severity of CAD was similarly corrected either with a speech summer camp or speech therapy sessions, it should be pointed out that the time spans of these two modalities are significantly different. The summer camp lasted 3 weeks. The speech therapy period included 12 months. In other words, similar results were obtained in a shorter period of time. Treating only the articulation disorders does not seem enough for these patients. It seems more appropriate to consider higher levels of language including abstract thought and reading and writing activities.

With limited time and resources, a shorter intervention addressing both CAD and language delay promises similar efficacy.

It should be considered that the total number of hours of speech therapy received by the patients included in the control group in a complete period of 12 months is 104 h. In contrast, the patients attend-

ing the summer camp received a total of 60 h in a complete period of 3 weeks. However, these figures are not necessarily comparable for several reasons. The patients receiving speech therapy sessions of 1 h, twice per-week, are encourage to participate continuously during the whole session. In comparison, the patients attending the summer camp, participate in a wide range of activities during the 4 h they remain at the camp each day. Nonetheless, it is impossible to keep children participating in all activities continuously. The patients attending the summer camp have lunch, go to the bathroom several times and spend short periods of time just playing without an active participation in a specific activity. The purpose of this paper was to study the efficacy of receiving speech therapy in a completely different setting than the conventional speech therapy session at the hospital. The period of the summer camp was selected according to the vacation time approved by schools in Mexico. The period of 1-year follow-up period for the control group was selected according to previous experience in our center that in this period of time, most of the children show significant improvement.

Another issue is the cost of these two modalities for providing speech therapy. The patients at our center pay a fee according to the social–economical study performed by the social service. The average cost of a speech therapy session is US\$ 3.9. Thus, in a period of 12 months, the average total cost is US\$ 412. For the entire summer camp (3 weeks), the average total cost per patient is US\$ 100. It should be kept in mind that all the cost of this study were funded by generous donations of “Smile Train” and the Hospital Gea Gonzalez. Thus, the costs mentioned herein are not actually afforded by the patients.

In the last few years, Golding–Kushner has described several procedures for speech therapy in cleft palate patients. She has reported good results involving drills with a focus on frequent and rapid repetition, frequency of therapy and frequently reinforcement at home several times a day [30]. As mentioned herein, in our center we provide speech therapy addressing articulation but also considering higher levels of language. About our position regarding speech therapy, it seems necessary to consider that the patients attending the Hospital Gea Gonzalez in Mexico City, come from families with very low educational levels and severe social and economical limitations. Bishop [31], have reported that language impairments are significantly more frequent in families with low educational level of parents and low social–economical status. Moreover, Pamplona et al. [8]

have previously reported that linguistic impairments are significantly higher in the cleft palate population at the Hospital Gea Gonzalez in Mexico City. Therefore, although we try our best for obtaining family support for participation during therapy as well as for reinforcement at home, it seems quite understandable that these families find very difficult to cooperate enough in the patient's therapeutic process. These are some of the reasons supporting our approach, which tries to provide an intervention as complete as possible. During the summer camp, frequency of therapy was obviously increased since the patients were participating in the activities on a daily basis. The participation of the parents every day significantly increased their participation and subsequently the reinforcement at home. These are some of the possible explanations why the decrease in the severity of the CAD or even in some cases, the correction of the CAD was possible in a significantly shorter period of time.

Although the reduced number of patients and the homogeneity of the study groups included in this study does not seem to allow definite conclusions, the results are encouraging.

In future projects, it will be necessary to include more patients in the summer camps during the next few years. It will be also necessary to include patients covering a broader spectrum of the disease, that is, patients with different types and degrees of clefts, different levels of linguistic development, families with different social, economical and educational status, etc. With these elements, we will be able to further assess the efficiency of this approach for correcting CAD associated with cleft palate.

## Acknowledgements

This study was funded with donations from "Smile Train". The authors and the patients who participated in this project would like to acknowledge "Smile Train" generous support and to manifest their most sincere and profound gratitude.

## References

- [1] J. MacDonald, J. Carroll, Communicating with young children: an ecological model for clinicians, parents and collaborative professionals, *Am. J. Speech Lang. Pathol.* 25 (1992) 38–55.
- [2] L. Bloom, M. Lahey, *Language Development and Language Disorders*, Wiley, New York, 1978.
- [3] M. Pamplona, A. Ysunza, M. González, et al. Linguistic development in cleft palate patients with and without compensatory articulation disorder, *Int. J. Pediatr. Otorhinolaryngol.* 54 (2000) 81–91.
- [4] J. Norris, P. Hoffman, *Whole Language Intervention for School-Age Children*, Singular, San Diego, 1993.
- [5] B.J. McWilliams, H.L. Morris, R.L. Shelton, *Cleft Palate Speech*, Decker, Philadelphia, 1990.
- [6] G.L. Powers, *Cleft Palate*, Pro-Ed, Austin, 1986.
- [7] M. Pamplona, A. Ysunza, Active participation of mothers during speech therapy improved language development of children with cleft palate, *Scand. J. Plast. Reconstr. Hand Surg.* 34 (2000) 231–237.
- [8] M. Pamplona, A. Ysunza, C. Urióstegui, Linguistic interaction: the active role of parents in speech therapy for cleft palate patients, *Int. J. Pediatr. Otorhinolaryngol.* 37 (1996) 17–27.
- [9] M. Pamplona, A. Ysunza, Y. Jiménez-Murat, Mothers of children with cleft palate undergoing speech intervention change communicative interaction, *Int. J. Pediatr. Otorhinolaryngol.* 59 (2001) 173–179.
- [10] M. Pamplona, A. Ysunza, M. Guerrero, et al. Surgical correction of velopharyngeal insufficiency with and without compensatory articulation, *Int. J. Pediatr. Otorhinolaryngol.* 34 (1996) 53–59.
- [11] R.J. Shprintzen, *Surgery for speech: the planning of operations for velopharyngeal insufficiency with emphasis on the preoperative assessment of both pharyngeal physiology and articulation*, in: M.Y. Ferguson (Ed.), *Proceedings of the British Craniofacial Society*, University of Manchester Press, Manchester, 1988.
- [12] D. Kuehn, K.T. Moller, Speech and language issues in the cleft palate population: the state of the art, *Cleft Palate-Craniofac. J.* 37 (348) (2000) 1–35.
- [13] A. Ysunza, M. Pamplona, M. Mendoza, et al. Surgical outcome and maxillary growth in patients with unilateral cleft lip and palate operated on at 6 versus 12 months of age, *Plast. Reconstr. Surg.* 102 (1998) 675–680.
- [14] K. Chapman, Phonologic processes in children with cleft palate, *Cleft Palate-Craniofac. J.* 30 (1993) 64–71.
- [15] M. Pamplona, A. Ysunza, J. Espinoza, et al. A comparative trial of two modalities of speech intervention for compensatory articulation in cleft palate children, phonological approach versus articulatory approach, *Int. J. Pediatr. Otorhinolaryngol.* 49 (1999) 21–26.
- [16] M. Pamplona, A. Ysunza, P. Ramírez, Naturalistic intervention in cleft palate children, *Int. J. Pediatr. Otorhinolaryngol.* 68 (2004) 75–81.
- [17] D.A. Kernahan, R.B. Stark, A new classification for cleft lip and palate, *Plast. Reconstr. Surg.* 22 (1958) 435–443.
- [18] M. Mendoza, C. Azzolini, A. Ysunza, et al. Minimal incision palatopharyngoplasty, *Scand. J. Plastic. Reconstr. Surg. Hand Surg.* 28 (1994) 199–205.
- [19] R.J. Shprintzen, K.J. Golding-Kushner, Evaluation of velopharyngeal insufficiency, *Otolaryngol. Clin. N. Am.* 22 (1989) 519–536.
- [20] J.E. Trost-Cardamone, Speech anatomy physiology and pathology, in: D. Kernahan, S. Rosenthal (Eds.), *Cleft Lip and Palate: A System of Management*, Williams & Wilkins, Baltimore, 1990.
- [21] J.E. Trost-Cardamone, J.E. Bernthal, Articulation assessment procedures and treatment decisions, in: K.T. Moller, CD. Starr (Eds.), *Cleft Palate: Interdisciplinary Issues and Treatment*, Pro-Ed, Austin, 1993.
- [22] A. Ysunza, M. Pamplona, Change in velopharyngeal valving after speech therapy in cleft palate patients, *Int. J. Pediatr. Otorhinolaryngol.* 24 (1992) 45–54.



- [23] K.S. Goodman, *What's Whole in Whole Language*, Heinemann, Portsmouth, 1986.
- [24] J. Norris, P. Hoffman, *Storybook-Centered Themes, Communication Skill Builders*, Tucson, 1995.
- [25] A. Ysunza, M. Pamplona, *Diagnóstico y Tratamiento de los Trastornos de Articulación en el Niño con Paladar Hendido*, Porrúa, México, 2002.
- [26] A.R. Feinstein, *The Architecture of Clinical Research*, WB Saunders, Philadelphia, 1985.
- [27] B. Rossner, *Fundamentals of Biostatistics*, Dusbury, Pacific Grove, 2000.
- [28] A.R. Feinstein, *Multivariate Analysis*, Yale University Press, New Haven, 1996.
- [29] P. Hoffman, Clinical Forum: Phonological assessment and treatment. Synergistic development of phonetic skill, *Lang. Speech Hear. Serv. Sch.* 23 (1992) 254–260.
- [30] K.J. Golding-Kushner, *Therapy Techniques for Cleft Palate Speech & Related Disorders*, Singular, San Diego, 2000.
- [31] D.V. Bishop, Genetic and environmental factors risks for specific language impairment (SLI) in children, *Int. J. Pediatr. Otorhinolaryngol.* 67 (2003) 143–157.

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

SCIENCE @ DIRECT®