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Expressive linguistic development of Bangla-speaking children with severe congenital hearing impairment

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Abstract

To acquire speech and language using a hearing aid along with speech and language therapy plays a vital role for children with hearing impairment. The present study tries to determine the importance of speech therapy in developing expressive language of Bangla-speaking children with hearing impairment. In addition, this study shows their development of pragmatic capacity. A qualitative method is used in this research and the data are collected using a semi-structured questionnaire. All 14 participants of the research are divided into two groups: each consists of 7 children having the same level of hearing impairment at the same age but one of them is facilitated with SLT (Speech and Language Therapy). The result reveals that the phonological performance of Bangla-speaking children who receive speech and language therapy regularly and use hearing aids is better than that of Bangla-speaking children who use only hearing aids. The result of this study indicates a positive impact of providing speech and language therapy regularly for Bangla-speaking children with severe congenital hearing impairment.

Keywords: Bengali hearing-impaired children, Intervention of severe hearing loss, SLT, Hearing Aid, Severe congenital hearing-impaired children

1. Introduction

This research investigates the outcomes of using a hearing aid as well as receiving regular speech and language therapy (SLT) for a group of children with severe congenital hearing loss. For people who have difficulties with speech and language, eating, and swallowing problems, SLT is a proven treatment. SLT focuses on developing listening and speaking skills for children with hearing impairment. Speech is a powerful way of communication and hearing impairment hinders the development of proper communication.

1.1. Expressive Linguistic Features

Expressive linguistic features represent the neutrality of a language; It is a form of language performance ranging from linguistic to paralinguistic and extra-linguistic features (Tynbayeva & Yakhina, n.d.). To suit the use of a persons' communicative functions, the systematic variation in all levels of its

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structure like- phonology, morphology, lexicology, and syntax, varies in various contexts.

Acquired or developmental hearing impairment impacts the expressive linguistic features of a child. When impairment occurs after a period of normal development, it is acquired, but when impairment occurs before the birth or just after the birth, it refers to a developmental hearing impairment (Bressert, n.d.).

This study has been designed to collect data from only severe hearing-impaired children. 'WHO grades for hearing impairment' chart indicates that if the hearing limit is between 61-80 dB, it is severe hearing impairment (Mathers et al., 2003). From the diagnostic report of my participants, I identified the children with severe hearing impairment. In addition, this study has been designed to find out desired outcomes based on data collected from only congenital hearing-impaired children.

1.2. Intervention

The capacity of hearing plays a vital role in the acquisition and development of spoken language. That is why hearing-impaired people need intervention to learn spoken language. Early diagnosis is important for children because the first few years are crucial to learning a language. According to the theory of CPH (Critical Period Hypothesis, there is an ideal age to acquire a language. Lenneberg (1967) argued that only within the critical period extending from early infancy to puberty, a child could acquire language; after puberty, it cannot be learned in a normal, functional sense.

This theory provides direct evidence for the language learning of hearing-impaired children. So hearing-impaired children need early diagnosis and intervention to learn a language (François et al., 2015). Intervention includes proper diagnosis, providing necessary aids, proper use of a device, maintenance, therapy, appropriate language learning environment, and other necessary supports. Necessity and procedure of intervention depend on the criteria of hearing impairment.

There is a universal agreement that all children with hearing impairment should develop their language early in life as an effective means of communication (Gravel & O'Gara, 2003).

1.3. Purpose of the study

This purpose of the study is to help determine the importance of proper intervention in developing expressive linguistic elements for Bangla-speaking children with severe congenital hearing impairment. In this study, only the phonological expertise has been considered among all expressive linguistic elements.

This research tries to find out the importance of speech and language therapy to develop the expressive linguistic features of Bangla-Speaking children with severe congenital hearing loss. In addition, it tries to discover whether only the use of a hearing aid is enough or the use of a hearing aid along with SLT is much effective to develop their expressive linguistic features. So, the objectives of this research are

1) to identify the importance of intervention.

2) to explain whether only using a hearing aid is enough for expressive linguistic development or besides a hearing aid, SLT is also necessary to get a better outcome.

1.4. Literature review

Several pieces of research have been conducted on the effectiveness of the hearing aid for children with hearing loss, even in the case of those who have a severe or profound hearing impairment. Using a hearing aid is the most common way to compensate for hearing impairment. The primary goal of using a hearing aid is to restore audibility. Rather in a noisy environment, using a hearing aid has shown satisfactory results in a quiet environment (Kochkin, 2009).

Early intervention is also important for the acquisition of language. So, diagnosis, use of hearing aid, and proper intervention also play a vital role to acquire speech and language (Bloomfild,1935).

Children who have a hearing impairment or are hard of hearing can get the maximum acoustic neurological benefit by using such modern hearing technology as digital hearing aids. Children with severe hearing impairment can develop language and listen using digital hearing aids (Durieux-Smith et al., 2008).

In several studies, it is found that those hearing-impaired children who started using appropriate hearing aid from an early age with proper intervention can enter mainstream society and enter a normal school. The research paper “Outcomes for Young Children with Hearing Loss in an Auditory-Verbal Therapy Program” compared two groups; one group consisted of hearing-impaired children who were facilitated with AVT therapy for their intervention, and another group consisted of typical hearing children. They studied over 50 months and found that developmental progress for language skills was at the same rate as the typical hearing group (Dornan, 2010). However, some research has proved that moderate to severe congenital bilateral hearing loss has a slight impact on a child’s schooling, but that depends on the retention grade. Those children who have a moderate bilateral hearing impairment, fitted with a hearing aid, can now attend a regular school (François et al., 2015).

2. Methodology

The qualitative research method has been used for data collection. The researcher has conducted interviews with the participants. A Semi-structured questionnaire was used for the interview. The qualitative research methodology was effective to understand the status of expressive linguistic features of severe congenital hearing-impaired Bangla-speaking children.

2.1. Participants

The data for this study were collected mainly from severe congenital hearing-impaired Bangla-speaking children. The number of total participants was 14. They were divided into two groups: one consisted of 7 children with severe congenital hearing impairment, regularly wearing hearing aids, facilitated with SLT for last three years, and another consisted of the rest of the 7 children of the control group having the same facility except SLT.

The mean age of the participants was 7.34 years. All the children's mother tongue was Bangla. The researcher tried to ensure that all the children's parents were using the standard form of Bangla at home so that collected data may get rid of the influence of the dialects of the Bangla language.

2.2. Data collection and processing

For data collection, two schools were chosen: both were renowned schools of Bangladesh. Both of them had a separate section for hearing impaired children. They had specialized teachers and other facilities. But of the two schools, one had no speech and language therapy section. So, only the students of other schools were facilitated with Speech and Language Therapy, but students of earlier one did not get any Speech and Language Therapy facility.

Data for the language assessments of severe congenital hearing-impaired Bangla-speaking children were collected from participants directly. Data collection was carried out by one session; each session lasted for approximately 40 to 50 minutes. In a quiet room, each child was tested individually. In addition, teachers provided the information of four specific questions about the participants, added in the appendix (0.2 Other Information).

At first, with the help of a specialized school teacher, I selected those hearing-impaired children who were severe congenital hearing impaired and attended school for at least three years. Participants were identified as severe congenital hearing impaired on the basis of their medical assessment report. Moreover, those students were chosen whose family members were using the standard form of Bangla at home.

After choosing, the students, each of them was taken into an isolated room along with their teacher. I tried to make a good relationship with them by giving them some chocolates and warm behavior. They were asked to repeat each word by following my voice. Three words for each phoneme were chosen in three different positions (initial, middle & final); the chart can be found in the appendix. Each of their utterances was written down on a sheet of paper and recorded as well. After collecting data, I praised them for their cooperation. When I took data from each child, I gave them a short break every 9-10 minutes so that they did not lose their attention.

2.3. Stimuli

To collect data, vocal prompts were used to assess the participants' expressive linguistic features, for example, to examine their performance in producing bilabial sound /p/, I sat just beside them and uttered [pat̪a], and then they tried to utter the same word.

2.4. Data analysis

The method used in this research for analyzing the data is comparative analysis. The percentage of performance on each phoneme in three positions- initial, middle, and final has been presented comparatively. Obtained results have been discussed on the basis of linguistic theory and aspects of SLT. To represent the expressive linguistic ability to use each

phoneme of Bangla language, the place of articulation of Bangla consonants was considered.

3. Findings

Two groups of children were selected to obtain the objectives of this research. The ability to use speech efficiently and accurately to decode and comprehend other people, speech clarity is very important. Perfect use of 'place of articulation' helps to make speech intelligible. The place of articulation of each phoneme is an important element of expressive linguistic features. That is why of all the features of expressive language, only the place of articulation was focused in this research. All consonantal phonemes of the Bangla language elicited from Bangla-speaking children with severe congenital hearing impairment were considered. For each phoneme, different words were picked so that the utterance of each phoneme in different positions can be considered. Here, by using the word "different position", I mean- initial, middle, and final position of each phoneme.

3.1. Data presentation

Here, to represent the expressive ability of using each phoneme of Bangla-speaking children with severe congenital hearing impairment, only the place of articulation has been discussed.

3.1.1. Place of articulation

Place of articulation is one of the prior concerns to depict the nature of expressive features of the Bangla language. As expression encompasses the accuracy of the production of the phoneme, this research has focused on the phonetic representation of each phoneme of the Bangla language. The elementary construction of a phonetic representation of each phoneme has been shown with binary opposition in Appendix. This binary opposition has revealed both the experimental and control groups' performance.
In the case of the Bangla language, place of articulation covers the following characteristics-

- Bilabial
- Dental
- Palato-dental
- Alveolar
- Palatal
- Velar
- Glottal

In this research, the two groups comprised of seven participants. All characteristics of the place of articulation have been examined upon all the participants of each group. All the words used as the element of examination have been taken for each phoneme with the position of Initial, Middle, and Final; the table can be found in the Appendix (01. Each Phoneme in three Different positions). The binary opposition has been depicted by (+) and (-).

3.1.1.1. Bilabial Sounds

Bilabial sounds are those which are produced with the association between two lips. In Bangla language, Bilabial phonemes are /p/, /pʰ/, /b/, /bʰ/, and /m/ (Ali, 2012).

As regards /p/, six children of each group have been able to produce /p/ accurately in the initial position. In the middle position, six children of the experimental group and seven children of the control group have produced the phoneme /p/ properly. In the final position /p/ phoneme has been articulated accurately by six children of the experimental group and three children of the control group.

It has been found that mostly /p/ bilabial sound was produced accurately in the middle position by each group.

In the case of /pʰ/ six children of the experimental group and five children of the control group have articulated properly. But in the middle position, four children of the experimental group and one of the control groups have been able to articulate /pʰ/ phoneme. In the final position, six children of the experimental group and two children of the control group have properly uttered /pʰ/ phoneme. As regards /pʰ/, the children of both the groups have pronounced quite accurately at the initial position.

In pronouncing /b/, it has been seen those seven children in the experimental group and six children in the control group could articulate properly in the initial position. In the middle position, four children of the experimental group and one of the control group have correctly pronounced /b/ phoneme. As regards the final position, five children of the experimental group and one of the control group have articulated the phoneme /b/ appropriately. In contrast to other positions, in the initial position /b/ sound has been uttered accurately by most of the children of the experimental group and the control group.

Afterwards, /bʰ/ phoneme has been pronounced properly by three children of the experimental group and six children of the control group in the initial position. In the middle position, two children of the experimental group and four children of the control group have been able to produce /bʰ/ sound. In this regard, in the final position, one child of each of the groups has produced /bʰ/ phoneme properly.

The surprising issue is that /bʰ/ has been produced more properly by the control group's participants than the experimental group's in both the initial and middle positions, but equal performance can be seen in the final position.

Finally, the last phoneme /m/ in terms of initial position has been produced by all the participants of the experimental and control groups. In the case of the middle position, seven children of the experimental group and six children of the control group have pronounced /m/phoneme properly. In terms of final position, /m/ phoneme has been articulated properly by seven children of the experimental group and six children of the control group. In this regard, it has been shown that /m/ has been pronounced accurately by most of the children of the experimental group and control group.

From the perspective of bilabial sounds, the experimental group has done well in comparison to the control group. The performance of two groups of

children has been shown in the appendix (03. Place of Articulation: Bilabial Sounds).

3.1.1.2. Dental Sounds

Dental sounds are those which are produced with the association between the tip of the tongue and the ridge of the teeth. In Bangla language, dental sounds are /t̪/, /t̪ʰ/, /d̪/, / d̪ʰ/, and/n/ (Ali, 2012).

As regards /t̪/, all the children of both the groups have produced properly. In the middle position, seven children of the experimental group and four children of the control group have produced /t̪/ appropriately. In the final position, seven children of the experimental group, and four children of the control group were able to produce /t̪/ properly. The

In case of /t̪ʰ/ phoneme, six children of the experimental group and three children of the control group have produced /t̪ʰ/ properly in the initial position. In the middle position, five children of the experimental group and one child of the control group have produced /t̪ʰ/ phoneme properly. Similarly, in the final position, five children of the experimental group and one child of the control group have produced /t̪ʰ/ phoneme perfectly.

In pronouncing /d̪/, it has been seen that six children of the experimental group and seven children of the control group could articulate the phoneme properly in the initial position. In the middle position, five children of the experimental group and four children of the control group have pronounced /d̪/ properly. In this regard, in the final position, five children of both groups have articulated the sound /d̪/ appropriately. In contrast to other positions, in the initial position, /d̪/ sound has been uttered by most of the children of the experimental group and the control group accurately.

Afterwards, /d̪ʰ/ sound was enunciated in the initial position by seven children of the experimental group and three children of the control group. In the middle position, four children of the experimental group and one child of the control group have been able to produce /d̪ʰ/. As regards the final position, one child of the experimental group produced /d̪ʰ/ phoneme appropriately, but none of the children of the experimental group was able to produce this phoneme. The surprising issue is that a greater number of children of the control group have produced /d̪ʰ/ perfectly than that of experimental group in the initial position.

From the perspective of the dental phoneme, most of the children of the experimental group have done well in comparison to the children of the control group. The performance of the two groups of children has been shown in the appendix (04. Place of Articulation: Dental Sounds).

3.1.1.3. Palato-alveolar sounds

Palato-alveolar sounds are those which are produced with the association between the tip of the tongue and the alveolar ridge. In Bangla language, Palato-alveolar sounds are /t/, /tʰ/, /d/ and /dʰ/ (Ali, 2012).

As regards /t/, six children of the experimental group and two children of the control group have been able to pronounce it perfectly. In the middle position, five children of the experimental group and two children of the control group have produced /t̪/ properly. The last, in the final position, /t̪/

has been articulated accurately by four children of the experimental group, but none of the control group participants was able to produce it properly.
In the case of /tʰ/ phoneme, three children of the experimental group in the initial position and two children in the middle position have produced properly, but in the final position, none of the participants of both groups was able to produce /tʰ/ phoneme properly. In addition, participants of the control group at the initial and middle position were not able to produce /tʰ/ phoneme appropriately.
As regards /d/, it has been seen that, seven children of both groups could articulate the phoneme properly in the initial position. Similarly, in the middle position six children and in the final position one child of both groups could have articulated the phoneme /d/ properly.
In contrast to other phonemes, in pronouncing /d/ phoneme, both groups performed equally.
Afterwards, /dʰ/ sound was enunciated by six children of the experimental group and three children of the control group. In the middle position, three children of the experimental group have been able to produce /dʰ/ phoneme, but none of the control group participants has been able to produce /dʰ/. As regards the final position, six children from the experimental group and three children from the control group have produced /dʰ/ phoneme appropriately. The performance of two groups of children has been shown in the appendix (05. Place of Articulation: Palato-alveolar).

3.1.1.4. Alveolar sounds

Alveolar sounds are those which are produced with the flow of air that is stopped by creating a block between the tongue and the alveolar ridge. In Bangla language, alveolar sounds are /n/, /r/, /l/ and /ʃ/ (Ali, 2012).
As Regards /n/, seven children of the experimental group have been able to produce /n/ phoneme accurately in the initial position and so have the six children of the control group. In the middle position, four children of both groups have produced /n/ properly. The last, in the final position, /n/ has been articulated accurately by four children of the experimental group and five children of the control group.
In the case of /r/ phoneme, five children of the experimental group and two children of the control group have produced /r/ phoneme properly in the initial position. As regards the middle position, five children of the experimental group and two children of the control group have produced /r/ phoneme correctly. In the final position, one child of the experimental group and two children of the control group have produced /r/ phoneme properly.
In the final position, participants of the control group performed better than that of the experimental group.
In pronouncing /l/, it has been seen that in the initial position, seven children of the experimental group and six children of the control group could articulate the phoneme properly. In the middle position, five children of the experimental group have been able to produce /l/ phoneme, but only one participant of the control group has been able to produce /l/ phoneme correctly. In this regard, in the final position, six children of the experimental group and four children of the control group have produced /l/ phoneme

appropriately. In contrast to other positions, in pronouncing /l/ phoneme, both groups performed well in the initial position.

Afterwards, /ʃ/ phoneme was enunciated by six children of the experimental group and four children of the control group. But in the middle position, although one child of the experimental group has been able to produce /ʃ/ phoneme, none of the control group participants have been able to produce /ʃ/. As regards the final position, three children of each group have produced /ʃ/ phoneme appropriately. The performance of two groups of children has been shown in the appendix. (06. Place of Articulation: Alveolar).

3.1.1.5. Palatal sounds

Palatal sounds are produced with the body of the tongue raised against the hard palate. In Bangla language, palatal phonemes are /c/, /cʰ/, /ɟ/ and /ɟʰ/ (Ali, 2012).

As regards /c/, six children of the experimental group have been able to produce /c/ phoneme accurately at the initial position and the same level of performance is shown by four children in the control group. In the middle position, five children of the experimental group and six children of the control group have produced /c/ phoneme correctly. Last but not the least, in the final position, /c/ phoneme has been articulated accurately by three children of each group.

In the case of /cʰ/ phoneme, six experimental group children and one child of the control group have produced /cʰ/ phoneme properly in the initial position. In the middle position, although three children of the experimental group have produced /cʰ/ phoneme correctly, none of the control group participants has produced /cʰ/ phoneme correctly. In the final position, three children of the experimental group and two of the control group have produced /cʰ/ phoneme properly.

In pronouncing /ɟ/, it has been seen those five children of the experimental group and two children of the control group could articulate the phoneme properly in the initial position. In the middle position, six children of the experimental group have been able to produce /ɟ/ phoneme, but none of the participants of the control group has been able to produce /ɟ/ phoneme correctly in this position. Similarly, in the final position, although four children of the experimental group have produced /ɟ/ phoneme appropriately, none of the control group participants has articulated /ɟ/ phoneme correctly.

Afterwards, /ɟʰ/ phoneme was enunciated by five children of the experimental group and two children of the control group in the initial position. In the middle position, six children of the experimental group have been able to produce /ɟʰ/ phoneme, but none of the participants of the control group has been able to produce /ɟʰ/ phoneme correctly. Similarly, in the final position, although four children from the experimental group have produced /ɟʰ/ phoneme appropriately, none of the control group participants has produced /ɟ/ phoneme correctly. The performance of two groups of children has been shown in the appendix (07. Place of Articulation: Palatal).

3.1.1.6. Velar sounds

Velar sounds are produced with the back part of the tongue against the soft palate. In Bangla language, palatal phonemes are /k/, /k^h/, /g/, /g^h / and /ŋ/ (Ali, 2012).

As regards /k/, six children of the experimental group have been able to produce /k/ phoneme accurately in the initial position and so have two children of the control group. In the middle position, four children of the experimental group and one of the control group have produced /k/ phoneme correctly. The last, in the final position, /k/ phoneme, has been articulated accurately by six children of the experimental group and two children of the control group.

In the case of /k^h/ phoneme, of the experimental group, three children in the initial position and one child in the final position have produced /k^h/ phoneme properly. But in the middle position, all the children of the experimental group and in all positions (initial, middle, and final), all the children of the control group failed to produce /k^h/ phoneme correctly.

Similarly, as regards /g/, it has been seen that, five children of each of the both groups could articulate the phoneme properly in the initial position. In the middle position, five children of the experimental group have been able to produce /g/ phoneme, but none of the participants of the control group has been able to produce /g/ phoneme correctly. Similarly, in the final position, although six children of the experimental group have produced /g/ phoneme appropriately, none of the control group participants has articulated /g/ phoneme correctly.

But, the /g^h/ phoneme has been enunciated by five children of the experimental group and two children of the control group in the initial position perfectly. In the middle position, six children of the experimental group have been able to produce /g^h/ phoneme, but none of the participants of the control group has been able to produce /g^h/ phoneme correctly. Similarly, in the final position, although four children of the experimental group have produced /g^h/ phoneme appropriately, none of the control group participants has produced /g^h/ phoneme correctly.

Afterwards, /ŋ/ phoneme was enunciated by five children of the experimental group in the middle position but none of the control group participants. In the final position, four children of the experimental group h and two of the control group have produced/ŋ/ phoneme correctly. The performance of two groups of children has been shown in the appendix (08. Place of Articulation: Velar).

3.1.1.7. Glottal sounds

Palatal sounds are those which are produced by obstructing airflow in the vocal tract. In the Bangla language, the palatal phoneme is /h/ (Ali, 2012).

Concerning /h/, six children of the experimental group and two of the control group have been able to produce /h/ phoneme accurately in the initial position. In the middle position, three children of the experimental group have produced /h/ phoneme correctly, but none of the control group participants has produced it properly. The last, in the final position, /h/ phoneme has been articulated accurately by one child in the control group, but none of the participants of the experimental group has produced this

phoneme appropriately. The performance of two groups of children has been shown in the appendix (09. Place of Articulation: Glottal).

3.2. Preliminary conclusions of data analysis

With a critical viewpoint of the place of articulation, it can be said that the experimental group has performed far better than the control group in producing phonemes. But in case of a few phonemes, the control group performed better at some positions than the experimental group, and sometimes performed equally. Although differences in scores are not so notable for most of the phoneme, we should illuminate on them- /p/, /d/, /ʈ/, /ɖ/, /c/, /r/, /h/, /ʃ/ and /bʰ/.

In pronouncing /p/ phoneme, the control group (Middle-7) has done better than the experimental group (Middle-6) in the middle position. In the case of /r/ phoneme, the control group (Final-2) has performed better than the experimental group (Final-1) in the final position. Both groups have performed equally in the final position (Final-3) of articulating /ʃ/ phoneme. In case of /h/ phoneme, the control group (final-1) has done better than the experimental group in the final position (Final-0). On the other hand, it is prosaic that the experimental group has performed better. As regards /d/, both the groups (Initial- 7, Middle-6, Final-1) have performed at the same level. Concerning the pronunciation of the phoneme, /ʈ/ (Initial-7), it has been articulated perfectly by all in each group in the initial position. In the case of /ɖ/, the control group (Initial-7) has performed better than the experimental group in the initial position, and both groups have performed equally in the final position (Final-5). In the case of /c/, the control group (middle-6) has done better than the experimental group in the middle position (middle-5). But for /bʰ/ phoneme, the control group (Initial Position-6, Middle Position-4) has had pointedly better performance than the experimental group (Initial Position-3, Middle Position-2,) and at the final position, both groups performed equally (Final-1). It cannot be stated that the control group has articulated more accurately than the experimental group. Rather for these sounds, the control group has been nearer to the experimental group.

4. Discussion

The expressive language shows the way of perceiving the ability of a phoneme as well as morpheme and syntactic forms based on articulation. The process of uttering a phoneme follows different phonological structures of a language. With the phonetic representation, a phoneme can be determined whether the sound has been perceived as it is or not. If there is some deviation in producing some words or phonemes, the underlying cause must be identified in terms of their prosodic features. But in this study, the focal point is grounded on the severe congenital hearing-impaired children who have been using a hearing aid and taking SLT.

The theoretical aspect focuses on the deviation from the natural sound to the perceived sound considering phonological rules of the Bangla language. Mostly, for these severe congenital hearing-impaired children, phonemic awareness has been considered based on the performance of responses.

Mavilya (1972) shows that differences are more prominent in the phonemic aspect of vocalization of normally hearing infants than that of hearing-impaired infants. According to her, a severe delay of developing consonant sounds in the vocalization of hearing-impaired infants with vowels produced more than consonants (Mary and Nancy, 1982).
This study uses words as stimuli that have been taken for each phoneme with the position of Initial, Middle, and Final. Participants of both groups have performed well in the initial position compared to the middle and final position. I think it is easy to identify the place of articulation initially compared to other phonemic positions. That is why most of the children of both groups performed better in the initial position than in other positions. In this research, by doing a cross-section of obtaining data, mostly two types of error have been found

- Omission
- Substitution

The tendency of 'omission' and 'substitution' is visible between the two groups. It has been found that both groups have performed better in terms of the 'First' position rather than the 'Middle' and 'Final' position.

4.1. Omission

Omitting a sound in a word is called omission (Daymut, 2009). By far, the single most frequently reported error in the speech production of severely and profoundly hearing-impaired children is the omission of a phoneme (Hudgins & Numbers, 1942). Omission of consonants may occur in the initial, middle and final position of words.
From the data, it is found that all the participants tend to omit phonemes whether it is in the initial, middle, or final position. Data retrieved from this research participants refer that omission mostly happened at the middle position. As regards the phonemic assessment in the 'Middle' position, most of the words of the questionnaire are constituted with two or three syllables which is the reason why the tendency to omit phonemes more frequently happens in the middle position. The tendency to omit the 2nd syllable or a part of the 2nd syllable has occurred frequently. For instance

/bɔcʰor/- /bɔ..o/
/bacal/-/ba..ai/

4.2. Substitution

Substitution is replacing one sound with another (Daymut, 2009). Hearing-impaired speakers tend to position their articulators fairly accurately, especially for those places of articulation that are highly visible but fail to coordinate properly the movement of the articulators (Huntington et a1., 1968).
Obtaining data refer to substituting the phoneme happened more frequently than omission by the participants of this research. Substitution happened at all positions of the phoneme, which means it happened at the initial, middle, and final positions. For instance, in the 'Final' position as regards /p/, four

control group participants and one experimental group participant have substituted it for other phonemes. Of them, three participants replaced /pʰ/ instead of /p/, and another two participants have pronounced /m/ replacing /p/.

Mostly, one phoneme has been substituted for the same category of phoneme (Place of Articulation), which means all of the bilabials are substituted with the other bilabial phonemes. Substitution patterns mostly follow Grimm's Law, but exceptions also happened, such as three of the participants of two groups have pronounced /pʰ/ substituting /p/ phoneme, but two participants have pronounced /m/ instead of /p/ phoneme.

According to the Grimm's Law (Huq, 2003), the substitution of /pʰ/ instead of /p/ follows the first rule: the voiceless stop follows the voiceless fricative.

/p/- /pʰ/

As Stark (2004) reported, hearing-impaired children are different from typically developed children due to phonemic production rather than the quantity of vocal output, which means they face problems in articulation. Data of the present research refer that participants of this research frequently omitted and substituted phonemes. It happened due to poor knowledge of the place of articulation. As the place of articulation plays a vital role in speech and language therapy for hearing impaired children, it helps to develop phonemic production.

Moreover, from data collected from severe congenital hearing-impaired Bengali children, some unique point has been noticed. For instance, the control group has not been able to produce /tʰ/, and /kʰ/ at all. The characteristics of these phonemes are 'Plosive' and 'Aspirated'. On the other hand, the control group has performed comparatively well in pronouncing /ɟʰ/, /bʰ/, /gʰ/, and /dʰ/: these phonemes contain three features together; 'voiced', 'plosive' and 'aspirated'. They performed better than the experimental group in the case of /bʰ/ phoneme and in producing /ɟʰ/, /gʰ/, and /dʰ/, the performance of both groups is nearer. From this viewpoint, it is a matter of question why the participants of the control group performed poorly for the phoneme /tʰ/, and /kʰ/ though these phonemes comprise only two features- 'Plosive' and 'Aspirated'. But at the same time, they performed well in the case of /ɟʰ/, /bʰ/, /gʰ/ and /dʰ/ though these phonemes comprise three features together: 'voiced', 'plosive' and 'aspirated'. The noted point is that of all these phonemes mentioned here, two common features are 'Plosive' and 'Aspirated'. There is very limited research on Bengali hearing-impaired children's expressive linguistic features. And features of the Bangla language and other languages like English differ a lot. That is why no supporting research has been found to explain why this type of result came out. So, this point may require further research. But from the viewpoint of this research objective, we can observe that the experimental group performed better than that of the control group in the case of each phoneme, which refers to the positive impact of SLT on the expressive fractures of Bengali children with severe congenital hearing impairment.

5. General conclusions

Based on obtained data, the result refers that the experimental group's performance in each section is better than that of the control group. As the

experimental group went throw regular speech and language therapy along with hearing aid, that is why their performance could be better than the control group in each section and most of the subsections as well. So, the importance of SLT is evident for Bangla-speaking children with severe congenital hearing impairment. Moreover, it is easy to understand that to develop a good level of expressive linguistic features of severe congenital hearing-impaired Bangla-speaking children, only the use of a hearing aid is insufficient. Along with hearing aid, SLT plays an important role to develop expressive linguistic features of Bengali children with severe congenital hearing impairment.

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Appendices

01. Each Phoneme in three Different positions

Phoneme	Initial	IPA	Middle	IPA	Final	IPA	Comment
/P/	পাতা	pa.ʈa	আপেল	a.pel	কাপ	kap	
/pʰ/	ফুল	pʰul	ফরফর	pʰɔr.pʰɔr	হাফ	hapʰ	
/b/	বাম	bam	অবাক	ɔ.bak	ডাব	dab	
/bʰ/	ভুল	bʰul	অভাব	ɔ.bʰab	আভা	a.bʰa	
/t/	তাল	ʈal	মাতাল	ma.ʈal	আতা	a.ʈa	
/tʰ/	থালা	ʈʰa.la	মাথাল	ma.ʈʰal	ব্যাথা	bæ.ʈʰa	
/d/	দাদা	ɖa.ɖa	আদল	a.ɖol	আদা	a.da	
/dʰ/	ধান	ɖʰan	বাঁধন	bã.ɖʰon	কাঁধ	kãdʰ	
/c/	চুল	cul	বাচাল	ba.cal	আঁচ	ãc	
/cʰ/	ছাল	cʰal	বছর	bɔ.cʰor	বাছা	ba.cʰa	
/ɟʰ/	জল	jɔl	আঁজল	ã.jol	আজ	aj	
/ɟʰ/	ঝাল	jʰal	ঝরঝরে	ɟʰɔr.ɟʰɔre	ঝাঁঝ	ɟʰãɟʰ	
/t/	টাকা	ta.ka	হাটুরে	ha.tu.re	হাটা	ha.ta	
/tʰ/	ঠক	tʰɔk	হঠাত	hɔ.tʰaʈ	কাঠ	katʰ	
/d/	ডাব	dab	ডামাডোল	da.ma.dol	লোড	lod	
/dʰ/	ঢাকা	dʰa.ka	ঢুলুঢুলু	dʰu.lu.dʰu.lu	-		
/k/	কাপ	kap	সকাল	sɔ.kal	নাক	nak	
/kʰ/	খাম	kʰam	মুখর	mu.kʰɔr	সুখ	sukʰ	
/g/	গাছ	gacʰ	ছাগল	cʰa.gol	দাগ	ɖag	
/gʰ/	ঘাস	gʰas	রাঘব	ra.gʰob	বাঘ	bagʰ	
/ŋ/	-		ব্যাঙ্গাচি	bæŋ.a.ci	ব্যাঙ	bæŋ	
/m/	মাথা	ma.tʰa	আমার	a.mar	বাম	bam	
/n/	নাক	nak	কনক	kɔ.nok	কান	kan	
/r/	রাত	raʈ	বরাত	bɔ.raʈ	ডর	dɔr	
/ɽ/	-		তড়িৎ	ʈo.ɽiʈ	তাড়ি	ta.ɽi	

/ʃ/	সুখ	sukʰ	অসুখ	ɔ.sʰuk	হাঁস	hãs
/h/	হাত	hat̪	বাঁহাত	bã.hat̪	বাহ	bah
/l̪/	লাল	lal	বালক	ba.lok	ডাল	dal

0.2 Other Information

1. Duration of using hearing aid:
2. Year of school admission:
3. Facilitated by SLT- Yes/ No
4. From when started to take SLT

03. Place of Articulation: Bilabial Sounds

		The experimental group							**The control group**						
Place of Articulation	Phoneme	P1	P 2	P 3	P4	P5	P 6	P7	P1	P2	P3	P4	P5	P6	P 7
Bilabial	**/p/**														
	I	+	+	+	+	+	+	-	-	+	+	+	+	+	+
	M	+	+	+	+	+	-	+	+	+	+	+	+	+	+
	F	+	+	+	+	-	+	+	-	+	+	+	-	-	-
	/pʰ/														
	I	+	+	+	-	+	+	+	+	+	+	+	+	-	-
	M	-	-	-	+	+	+	+	-	-	-	+	-	-	-
	F	-	-	-	+	+	-	-	-	-	+	+	-	-	-
	/b/														
	I	+	+	+	+	+	+	+	-	+	+	+	+	+	+
	M	-	+	+	+	+	-	-	-	-	-	+	-	-	-
	F	+	+	+	+	+	-	-	-	-	-	-	-	+	+
	/bʰ/														
	I	-	-	-	+	+	+	-	+	+	+	+	+	+	-
	M	-	-	+	+	-	-	-	+	+	+	+	-	-	-
	F	-	-	-	+	-	-	-	-	-	-	-	+	-	-

	/m/															
	I	+	+	+	+	+	+	+	+	-	+	+	+	+	+	
	M	+	+	+	+	+	+	+	+	+	+	+	+	-	+	
	F	-	+	-	+	+	+	+	+	+	-	+	+	+	-	

04. Place of Articulation: Dental Sounds

		The experimental group							**The control group**						
Place of Articulation	Phoneme	P1	P 2	P3	P4	P5	P6	P7	P1	P2	P3	P4	P5	P6	P7
Dental		/ t̪/													
	I	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	M	+	+	+	+	+	+	+	+	-	+	-	+	-	+
	F	+	+	+	+	+	+	+	-	+	-	+	+	+	-
		/t̪^{h}/													
	I	+	+	+	-	+	+	+	-	+	-	+	+	-	-
	M	+	+	+	+	-	+	-	-	-	+	-	-	-	-
	F	+	+	+	-	+	+	-	-	-	-	+	-	-	-
		/d̪/													
	I	+	-	+	+	+	+	+	+	+	+	+	+	+	+
	M	+	+	-	+	+	+	-	-	-	-	+	+	+	+
	F	+	+	+	+	+	-	-	+	+	-	-	+	+	+
		/ d̪^{h}/													
	I	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	M	-	-	+	+	+	+	-	+	+	+	-	+	+	+
	F	+	-	-	-	-	-	-	+	-	-	-	-	-	-
		/n/													
	I	+	+	+	+	+	+	-	+	+	-	-	-	+	-
	M	-	-	+	-	+	+	-	-	-	-	-	-	-	-
	F	-	+	+	+	+	+	+	-	+	+	-	-	+	-

Journal of Child Language Acquisition and Development – JCLAD
Vol: 10 Issue: 1 476-498, 2022
ISSN: 2148-1997

05. Place of Articulation: Palato-alveolar

		The experimental group							The control group						
Place of Articulation	Phoneme	P1	P 2	P3	P4	P5	P6	P7	P1	P2	P3	P4	P 5	P6	P7
Palato-alveolar	/ t/														
	I	+	+	+	+	+	+	-	-	-	+	-	-	+	-
	M	+	+	+	-	+	+	-	-	-	-	+	-	+	-
	F	-	+	+	-	+	+	-	-	-	-	-	-	-	-
	/tʰ/														
	I	+	-	+	-	-	+	-	-	-	-	-	-	-	-
	M	+	-	+	-	-	-	-	-	-	-	-	-	-	-
	F	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	/d/														
	I	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	M	-	+	+	+	+	+	+	+	+	+	+	+	-	+
	F	-	+	-	-	-	-	-	-	-	-	+	-	-	-
	/ dʰ/														
	I	+	+	+	+	+	+	-	+	+	-	+	-	-	-
	M	+	+	-	-	+	-	-	-	-	-	-	-	-	-
	F	+	+	-	+	+	+	+	-	+	-	+	+	-	-

06. Place of Articulation: Alveolar sounds

		The experimental group							**The control group**						
Place of Articulation	Phoneme	P1	P 2	P3	P4	P5	P6	P7	P1	P2	P3	P4	P5	P6	P7
Alveolar	/ n/														
	I	+	+	+	+	+	+	+	-	+	+	+	+	+	+
	M	-	-	+	-	+	+	+	-	+	+	-	+	-	+
	F	-	+	+	-	+	-	+	+	-	+	-	+	+	+
	/r/														
	I	+	-	+	-	+	+	+	-	-	-	+	+	-	-
	M	+	+	-	-	+	+	+	-	-	+	-	+	-	-
	F	-	-	-	-	+	-	-	-	+	-	+	-	-	-
	/l/														
	I	+	+	+	+	+	+	+	+	+	+	-	+	+	+
	M	+	+	-	+	+	-	+	-	-	-	+	-	-	-
	F	+	+	+	-	+	+	+	+	+	-	-	+	-	+
	/ ʃ/														
	I	+	+	+	+	+	+	+	+	+	-	+	-	+	-
	M	-	-	+	-	-	-	-	-	-	-	-	-	-	-
	F	-	+	-	+	+	-	-	-	-	-	+	-	+	+

Journal of Child Language Acquisition and Development – JCLAD
Vol: 10 Issue: 1 476-498, 2022
ISSN: 2148-1997

07. Place of Articulation: Palatal sounds

		The experimental group							**The control group**						
Place of Articulation	Phoneme	P1	P 2	P3	P4	P5	P 6	P 7	P1	P2	P3	P4	P5	P6	P7
Palatal	/ c/														
	I	+	+	+	-	+	+	-	-	+	+	+	+	+	+
	M	+	+	+	-	+	+	-	+	+	+	+	+	+	-
	F	-	+	+	-	+	-	-	+	+	-	-	-	+	-
	/cʰ/														
	I	+	+	+	-	+	+	+	-	+	-	-	-	-	-
	M	-	-	+	+	+	+	+	-	-	-	-	-	-	-
	F	-	-	+	+	-	+	-	-	-	+	+	-	-	-
	/ɟ/														
	I	+	+	-	+	-	+	+	-	+	-	-	-	+	-
	M	-	+	+	+	+	+	+	-	-	+	+	-	-	-
	F	-	+	+	-	+	+	+	+	+	-	-	-	-	-
	/ɟʰ/														
	I	+	+	-	-	+	+	+	-	-	-	+	-	+	-
	M	+	+	+	+	+	+	-	-	-	-	-	-	-	-
	F	-	+	+	-	+	-	+	-	-	-	-	-	-	-

08. Place of Articulation: Velar sounds

		The experimental group							**The control group**						
Place of Articulation	Phoneme	P1	P 2	P3	P4	P5	P6	P7	P1	P2	P3	P4	P5	P6	P7
Palatal	/k/														
	I	+	+	+	+	+	+	-	+	-	+	-	-	-	-
	M	+	-	+	-	-	+	+	+	-	-	-	-	-	-
	F	+	+	+	-+	+	+	+	-	-	+	+	-	-	-
	/kʰ/														
	I	+	+	+	-	+	+	+	-	-	-	-	-	-	-
	M	-	-	-	-	-	-	+	-	-	-	-	-	-	-
	F	+	-	-	-	-	-	-	-	-	-	-	-	-	-
	/g/														
	I	+	+	+	+	+	+	+	+	+	+	-	+	+	-
	M	+	+	+	+	+	+	+	-	-	-	-	-	-	-
	F	+	+	+	+	+	+	+	-	-	-	-	-	-	-
	/gʰ/														
	I	+	+	-	-	+	+	+	-	-	-	+	-	+	-
	M	+	+	+	+	+	+	-	-	-	-	-	-	-	-
	F	-	+	+	-	+	-	+	-	-	-	-	-	-	-
	/ŋ/														
	M	+	+	+	-	+	+	-	-	-	-	-	-	-	-
	F	+	+	+	-	-	+	-	-	+	+	-	-	-	-

Journal of Child Language Acquisition and Development – JCLAD
Vol: 10 Issue: 1 476-498, 2022
ISSN: 2148-1997

09. Place of Articulation: Glottal sounds

		The experimental group							**The control group**						
Place of Articulation	Phoneme	P1	P 2	P3	P4	P5	P6	P7	P1	P2	P3	P4	P5	P6	P7
Glottal	/ h/														
	I	+	+	-	+	+	+	-	+	-	-	-	-	-	+
	M	+	-	-	+	-	-	+	-	-	-	-	-	-	-
	F	+	+	+	-	-	+	-	-	-	-	+	-	-	-