SUMMARY AND CONCLUSIONS
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Phonological assessment is an evaluation of an individual’s phonological status involving description of his /her speech sound production system and relating this system to the adult standard of the speaker’s linguistic community. According to Bankson and Bernthal (1993), phonological assessment is used to describe the phonological status of an individual and determine if his/her speech sound system is sufficiently different from the normal development to warrant intervention, to determine treatment direction and strategies to be used in the management of the client, to make predictive and prognostic statements relative to phonological change with or without intervention, to monitor change in phonological performance across time and to identify factors that may be related to the presence or maintenance of a phonologic disability.

Various scholars have developed many procedures for phonological assessment of children. These are Assessment of Phonological Processes-Revised (Hodson, 1980), Bankson-Bernthal Test of Phonology (Bankson and Bernthal, 1990), The Khan-Lewis Phonological Analysis (Khan-Lewis, 1986), Assessment Link Between Phonology and Articulation (Lowe, 1986), Phonological Process Analysis (Weiner, 1979), Natural Process Analysis (Shriberg and Kwiatkowski, 1980), Phonological Profile (Crystal, 1982), Phonological Analysis of Child Speech (Grunwell, 1985) and Phonological profile for the hearing- impaired (Vardi, 1991). Some of these procedures utilized single words, some used continuous speech and some used spontaneous speech for assessment.
From the past two decades, profiles are becoming popular. Some of the major comprehensive phonological profiles are PROPH, PACS and Vardi’s profile. PROPH and PACS consist of a bundle of different profile charts. These two profiles require rich data, take long time to administer, analyze and to transfer from the data charts to the analysis charts whereas, Vardi’s profile is comprehensive and less time consuming which are essential features for the clinical practice. However, the profile is applicable only for English speakers. This cannot be adapted to speakers belonging to any of the Indian languages, as the profiles are language specific. There is dearth of phonological profiles in Indian languages. Hence, the study was designed to develop phonological profile in Kannada, which was one of the objectives of the study. The other objectives of the study were as follows:

- To carry out phonological assessment in Kannada speaking normal children and in children with hearing-impairment using the phonological profile
- To develop a computerized module for the presentation of stimuli in the administration of phonological profile, which is developed in Kannada for phonological assessment

A phonological profile was developed in Kannada and was beneficial for phonological assessment of children. The present phonological profile reveals the various speech aspects of the normal and phonologically disordered children including vowels, consonants, place, manner, position in word, voiced/voiceless distinction, clusters, voice and suprasegmental problems. Speech intelligibility of the individual can also be determined.
The profile was administered to normal and hard of hearing children exhibiting phonological disorders. The three tasks were administered for phonological assessment of both the groups. The results based on the statistical analysis revealed that children with hearing impairment performed worse than normal children in the picture naming task (Task-1). Also it revealed the inclusion of written word as a clue, during the administration of picture naming task enhanced the elicitation of the phoneme production in both the groups. Hence, written word can be used as an added modality. The statistical analysis and the qualitative analysis carried out showed that the hard of hearing children exhibited 54 phonological processes and normal children exhibited 32 phonological processes. However, the common processes found in both the groups were 29. Also in the production of clusters (Task-2), children with hearing impairment performed worse than normal children. In addition, elicitation of spontaneous speech (Task-3) results reveal that hard of hearing children had obtained very low scores in speech intelligibility. Thus phonological assessment of both the groups was successfully carried out with the newly designed phonological profile. Hence, it can be concluded that the phonological profile developed in Kannada is useful for phonological assessment of Kannada speaking children.

A computerized module for the presentation of stimuli in the administration of phonological profile in Kannada, was developed for phonological assessment of children.
Conclusions

The following conclusions can be drawn from the study:

1. The phonological profile in Kannada was developed for carrying out phonological assessment of Kannada speaking normal children and children with phonological disorders. The profile is comprehensive, effective, exhaustive and sensitive to tap errors in vowels, consonants and clusters and to find out the various phonological processes occurring and to determine the speech intelligibility of the client. It provides phonological summary and is useful in phonological assessment of Kannada speaking children.

2. A computerized module was developed for the presentation of stimuli in the administration of phonological profile in Kannada, which was developed for phonological assessment.

3. The study conducted on both the groups has brought the following things into light:

- In normal hearing children studied in the age range of 5+ to 9+ years, 32 phonological processes occurred. Out of which a few phonological processes such as cluster reduction, epenthesis, nasal deletion and vowel lengthening occurred frequently, while the remaining (28 processes) occurred occasionally.

- Out of 29 phonological processes, which occurred commonly in both the groups, almost all phonological processes occurred frequently in children with hearing impairment except 3 processes, which occurred occasionally. These
were epenthesis, gliding of liquids, medial vowel deletion. In addition to these 29 processes, 25 phonological processes occurred exclusively in hard of hearing children.

- The processes which occurred most of the time (>60% of the subjects) in hearing-impaired after the age of 5 years are cluster reduction, denasalization, devoicing of consonants, fronting of retroflexes, palatals and velars, nasal deletion, stridency deletion, single consonant becoming double consonant, vowel fronting, vowel lowering, final syllable deletion, initial consonant deletion and medial consonant deletion.

- The processes which occurred frequently (>20% & <60% of the subjects) in hearing-impaired after the age of 5 years are affrication, alveolar assimilation, lateral replacing flap, final vowel deletion, monophthongisation, vowel backing, vowel lengthening, vowel shortening, vowel raising and aspiration, backing of alveolars, retroflexes, voicing, glide deletion, initial vowel addition, medial consonant substitution, r deletion, stopping of liquids and glides.

- Whenever the normal child produced stop + liquid cluster, it was observed that it would typically delete liquid. Also in the study, whenever /s/ + stop cluster occurred, it was not typically the deletion of /s/ that was found. Sometimes /s/ was deleted and sometimes /t/.

- Sometimes the phonological process, nasal deletion was accompanied by the lengthening of the preceding vowel.
• The processes deaspiration and ‘h’ deletion cannot be considered as unusual phonological processes in Kannada as these were found in high percentage of the normal children and also as these processes are very well accepted in the children’s spoken form in Kannada.

• Devoicing of consonants was observed in the prevocalic position in Kannada in initial and medial word positions. However, in English postvocalic devoicing of consonants is reported mainly in the final voiced consonants.

• Vowel with low tongue position was correct more often than the middle and high tongue position.

• In Kannada, fronting of retroflexes occurs, in addition to fronting of palatals and fronting of velars.

• In the study, velar fronting occurs both in initial and medial word positions without showing any difference in frequencies with respect to word position unlike in English, where velar fronting occurs more commonly in word initial than in word final position as reported in the literature.

• In Kannada, the order of consonant errors decrease from initial to medial to final position. This is in contradiction with western literature report which mentions that the order of consonant errors increase according to position in the word from initial to medial to final.
Children with hearing impairment performed worse than normal children in the production of clusters.

Hard of hearing children exhibited poor speech intelligibility, whereas the normal children exhibited very good speech intelligibility.

Thus, the phonological profile developed in Kannada is useful for phonological assessment of normal children and children with hearing impairment, who have phonological disorders.

Implications

The study will give an insight for developing phonological profile in different Indian languages. The study revealed that the phonological profile developed was useful in phonological assessment of normal children and children with hearing impairment, which means it will be useful for clients having phonological disorders. Profile highlights the part of the patient’s phonology that is disordered. This can be done in terms of units such as the phoneme or in broader terms such as the phonological processes. Profiles are directly, clinically relevant. Profile explicitly highlights those structures or units that are disordered and guides the therapist in decisions over prioritizing items for therapy. The profile allows the therapist more freedom in decision-making.
Suggestions for future research

- The study may be carried out on younger age groups.
- The study if carried out on a larger population, emphatic results may be obtained.
- More studies on similar lines will confirm the results.
- Phonological profiles need to be developed in different Indian languages.
- Computerized modules are to be developed for the administration of phonological profiles in different Indian languages.
- The phonological profile developed in Kannada are to be administered on different clinical population exhibiting phonological disorders.