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Performance of Malayalam Speaking Children Fitted with Hearing Aids on PEACH Scale

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Abstract: ***Parental questionnaires impart a better understanding of hearing technology utilization by children with Hearing loss(HL). They provide insights into the functional abilities and accomplishments of children equipped with Hearing Aids (HA). The present study aimed to translate and adapt the PEACH questionnaire into Malayalam language and evaluating its effectiveness in discriminating the functional hearing abilities of Malayalam speaking children with HL fitted with HAs at various stages of life. The Malayalam PEACH questionnaire was aPdministered to parents/caregivers of 40 Malayalam-speaking children aged 3 to 6, divided into two groups based on whether they received HA before or after the age of 2. Results revealed that children fitted with HA before 2 years of age demonstrated superior performance in quiet, noisy, and overall situations compared to those fitted after 2 years of age highlighting the importance of early identification of HL in children. Additionally, the questionnaire exhibited high reliability upon retesting across all of the three hearing situations (quiet,noise and overall). Therefore, the Malayalam PEACH questionnaire emerges as a dependable and effective tool for evaluating and monitoring the functional hearing abilities and communication skills of children fitted with HA or Cochlear Implants (CI) in their everyday lives.***

I. PERFORMANCE OF MALAYALAM SPEAKING CHILDREN FITTED WITH HEARING AIDS ON PEACH SCALE

Hearing Loss (HL) in infants or young children can have significant and far-reaching effects. It influences how they achieve their speech and language milestones and learn, potentially causing challenges in communication and education. Moreover, it also impacts the child's family and the support systems around them, including both official services and informal social circles (Tharpe & Seewald, 2016). Early intervention refers to the need to begin habilitation services as soon as a disability is confirmed. Significant HL if undetected early can lead to speech and language delay Depending on the findings of the audiological evaluation, a patient may be prescribed an appropriate amplification devices like Hearing Aid (HA) or Cochlear Implant (CI) and Assistive Listening Devices (ALDs) to alleviate communication difficulties associated with HL in their daily lives. (Tye murray, 2020, p.64). Early detection and intervention of HL leads to better speech and language development in children and includes providing and fitting appropriate amplification devices, as well as counseling and supportive services to parents and primary caregivers to help them accept and understand the child's diagnosis. (Northern and Downs, 2002, p. 148).The role of parents in the habilitation of their children with HL is critical to the child's success with amplification. The possibility for a child with HL to benefit the most from amplification is directly related to the level of assistance offered by the immediate family (Northern and Downs,2002, p. 338).

Outcome evaluation is an important step in the pediatric HA fitting process.(Bagatto et al, 2011). Assessing the benefits and setbacks of the fitted amplification device in various hearing situations through young children is difficult due to their immature developmental level and language abilities (Kumar et al, 2013). However, parents and educators are able to provide valuable insight regarding the effect of amplification in real-world settings. As a result clinicians and researchers depend to parent reports in order to determine functional performance in these groups and evaluate spontaneous responses to sounds in everyday life.

Subjective measures focus on the child's responses to various sounds in real-life situations, as reported by the caregiver. This kind of outcome evaluation provides significant and vital information that can support the more objective testing while also being more appropriate to children with challenging needs.(Bagatto et al, 2011). Parental questionnaires are more effective when conducted in the family's native language. However, it is important to remember that some administrative difficulties may develop when caregivers are not sufficiently literate. (Johnson & Danhauer, 2002). The LittlEARS Auditory Questionnaire (LEAQ, Mecklenburg, 1996), Infant Toddler Meaningful auditory Integration Scale [IT-MAIS] (Zimmerman & Phillips, 1997), ,Meaningful Auditory Integration Scale (MAIS, Robbins et al., 1998), The Auditory Behavior in Everyday Life (ABEL, Purdy et al., 2002) and the Parents' Evaluation of Aural/Oral Performance of Children [PEACH] (Ching & Hill, 2007) are the most widely used parental questionnaires to evaluate the amplification out comes in children with HL.

They play a vital role in assessing various aspects of auditory and oral performance, providing a comprehensive understanding of the child's experiences with amplification devices. The PEACH questionnaire is one such questionnaire used to assess the child's auditory experiences and communication patterns while utilizing HAs and/or CIs. Parents play a crucial role in this process by observing their child's listening behaviors in various everyday scenarios and providing ratings related to their hearing abilities and communication situations. The scores on quiet, noisy and overall situations derived from the PEACH questionnaire offer a comprehensive overview of the child's functional performance in daily life. Audiologists can leverage these results to tailor audiological interventions that specifically address the unique challenges faced by each child. Numerous studies in Western nations have been undertaken to evaluate the effectiveness of PEACH in children with HL employing HAs or CIs.

Gupta et al. (2023) translated and adapted the PEACH questionnaire into Bengali language to assess its efficacy in measuring the hearing performance of Bengali children with HL with HA fitted across different ages. The study investigated parents/caregivers of 40 Bengali-speaking children aged 3 to 6, divided into two groups: those fitted with HA before age 2 (Group 1) and those fitted after age 2 (Group 2), with 20 parents in each group. The findings revealed that children fitted before the age of two performed better in quiet, noisy and overall situations than those fitted later. Furthermore, the questionnaire demonstrated great reliability when retested, showing its use in monitoring the hearing performance and communication abilities of children fitted with HA in their daily life.

In a study by Eroglu et al. (2021), the PEACH questionnaire was translated and adapted in Turkish language for children to assess and validate the questionnaire's reliability and validity in a cohort of 120 children with HL (57 HA users; 63 CI users) aged between 3 and 12 years. The findings indicated that PEACH Scores exhibited a positive correlation with age, HA and CI usage. Additionally, children with bilaterally fitted CIs demonstrated superior performance compared to those with unilateral CI fitting. The study recommended the Turkish PEACH questionnaire as a practical tool for monitoring functional, auditory, and communication skills in children using HAs and CIs.

Levy et al. (2016) contributed to the global applicability of PEACH by translating, adapting, and validating the questionnaire in Brazilian Portuguese. The study involved 13 parents or guardians of children with moderate to severe HL. Results underscored the significance of the PEACH questionnaire in speech therapy for children with HL highlighting its utility in assessing the frequency of responses to sound stimuli in various environments, emphasizing the active involvement of family members in daily observations. This process aided professionals in validating the benefits of HAs and CIs.

Similarly, Brännström et al. (2014) translated and adapted the PEACH questionnaire into Swedish, conducting a validation study involving 27 families with children aged 6 to 50 months. The outcomes demonstrated psychometric properties similar to those reported in previous studies on PEACH. Moreover, a consistent relationship was observed between the overall scale score and age, aligning with earlier findings.

Quar et al. (2012) translated and adapted the PEACH questionnaire into the Malay language. The study involved 74 children with normal hearing, aged three months to thirteen years. The results indicated the applicability of Malay PEACH in assessing the functional aural/oral performance of Malaysian children with HL.

In the study conducted by Kumar et al. (2013), the functional language performance of 30 Tamil-speaking children with HL fitted with CI was examined, comparing those implanted early (before 2 years) and late (between 3 and 4 years). The results suggested that the late implant group performed poorer than the early implant group. Also, high test-retest reliability was observed in six participants upon administering the questionnaire twice.

To summarize, there are a few or limited studies on assessing the efficacy of PEACH questionnaire in Malayalam language. Hence the present study assumes heightened significance and aims to bridge existing gaps and explore the impact of PEACH questionnaire in Malayalam language on intervention age on the everyday functional language performance and communication skills of Malayalam-speaking children fitted with HAs.

Malayalam, a Dravidian language native to the Indian state of Kerala and some regions of Tamil Nadu, holds a significant place in the linguistic and cultural diversity of India. Today, spoken by 30 to 35 million people, Malayalam has its own script and boasts a literary tradition that spans centuries. It is recognized as one of the official languages of the state of Kerala, and its unique phonetic and grammatical features contribute to its distinct identity. The adaptation of the PEACH questionnaire into Malayalam will help audiologists to achieve a more inclusive understanding of the experiences of Malayalam-speaking children with HL fitted with HA, fostering linguistic and cultural sensitivity in audiological research and intervention practices.

II. METHOD

The adapted Malayalam PEACH Questionnaire was given to the caregivers/parents to evaluate the listening skills of children with HL and how it affects their functional hearing performance and communication skills in their daily life. PEACH (Ching & Hill, 2007) questionnaire was translated and adapted into Malayalam language and validated by 6 audiologists who were fluent in both Malayalam and English languages.

A. Participation Selection

From Kanhangad and Kannur districts of Kerala, 30 Parents /primary care givers of children having moderate - moderately severe SNHL fitted with HA in the age range of 3 - 6 years were selected for the study. Children were subdivided into two groups according to the age at which HA was fitted. All of them were undergoing speech therapy since 1 - 2 years.

Children were divided into two groups:

1) Group I - 20 children who were fitted with HA before 2 years of age and
2) Group II - 20 children who were fitted with HA after 2 years of age.

Children who were having other sensory impairment, neurological and cognitive impairment were excluded from the study.

B. Tool and Procedure used

Malayalam PEACH questionnaire by adapting PEACH (Ching & Hill, 2007) in English following the guidelines provided by Ching and Hill (2007) and given to parents of children with HL to fill it. The first part of PEACH questionnaire includes pre - rating checklist which includes 3 questions to assess if child is wearing amplification properly if the child is wearing it, if the child is healthy. Only if the answers of the above three questions are 'yes', the parent/ caregivers were asked to fill rest of the questionnaire. The second part of PEACH questionnaire comprises of 13 questions to assess children's usage of HA and discomfort in loudness, children's response in quiet and noisy situations, children' s response to vehicles, children's ability of telephonic conversation and children's response to sounds other than human voices.

C. Scoring

Quiet (A) - Questions 3+4+7+8+11+12 (A/24) X 100 Noise (B) - Questions 5+6+9+10+13 (B/20) X 100 Overall (C) - (A+B) (C/44) X 100

PEACH scoring includes Quiet (A) score, Noise (B) score and Overall (A+B) PEACH score expressed in percentage (%).

The questions/items were rated on a 4 point Likert scale where 0 = Never (0%), 1=Seldom (1 - 25%), 2= Sometimes (26 - 50%), 3= Often (51 - 75%) and 4= Always (75 - 100%). Questions from 3 till 13 is taken for the scoring.

D. Test-Retest Reliability

In order to evaluate the test-retest reliability of the Malayalam PEACH questionnaire, after filling the Malayalam PEACH questionnaire, 8 parents of children in Group I and 7 parents of children in Group II, filled it again after a four-week interval.

III. RESULTS AND DISCUSSION

Table 1: Comparison of quiet, noise, and overall between Group I (children fitted with HAs before 2 years of age) and Group II (children fitted with HAs after 2 years of age)

		Mean	S.D.		p value	Significance
Quiet	Early fitting	19.5	1.7		< 0.001	Sig.
	Late fitting	11.7	1.8			
Noise	Early fitting	13.3	1.2	16.09	< 0.001	Sig.
	Late fitting	7.1	1.2			
Overall	Early fitting	32.7	2.7	16.63	< 0.001	Sig.
	Late fitting	18.8	2.6			

S* Significance

Table 1 reveals that children in Group I(children fitted with HAs before 2 years of age) performed better than children in Group II(children fitted with HAs after 2 years of age) in quiet, noise, and overall situations hence significant differences was observed.

Test retest reliability-

Table 2

Groups		Frequency	%
Group	I	8	57.1
(Early fitting			
Group II (Late		6	42.9
fitting			

Table 2 shows the frequency of parents participated in the test-retest reliability of Malayalam PEACH questionnaire.

Table 3: Comparison (Test to re test) of quiet, noise, and overall between groups

	Groups	Test					Re-test				
		Mean			p value	Significance	Mean	S.D.		p value	Significance
Quiet	Early fitting	20.1	1.8	10.53	0.001*	Sig.	18.6	1.1	11.66	0.001*	Sig.
	Late fitting	11.0	1.3				11.5	1.2			
Noise	Early fitting	13.6	1.1	13.97	0.001*	Sig.	12.9	1.1	9.43	0.001*	Sig.
	Late fitting	6.3	0.8				7.3	1.0			
Overall	Early fitting	33.8	2.6	12.88	0.001*	Sig.	30.9	1.5	13.30	0.001*	Sig.
	Late fitting	17.3	2.0				18.8	1.9			

S* Signficance

Table 3 shows that significant difference in performance was observed in quiet, noise and overall scores of Group I and Group II children after an interval of 4 weeks observed by parents. The Independent sample "t" test was used to compare the test to re test data of quiet, noise, and overall situations between the two groups.

Table 4: Reliability analysis

	Test re test reliability		Intra class correlation coefficient (ICCC)		
	"r"	p value	ICCC	95%CI	Significance
Quiet	0.851	< 0.001*	0.903	0.70 to 0.97*	Sig.
Noise	0.904	< 0.001*	0.935	0.80 to 0.98*	Sig.
Overall	0.904	< 0.001*	0.926	0.77 to 0.98*	Sig.

S* Significance

Malayalam PEACH questionnaire was administered twice on 8 Parents of Group I children and 7 parents of Group II children after a gap of 4 weeks to evaluate test retest reliability of responses in children. Table 4 indicates that the obtained correlation coefficients were found to be significant ($p < 0.05$) and hence quiet, noise, and overall scores were reliable. Also, the measurements were consistent (95% CI for ICCC do not include "Zero") from test to re test.

IV. DISCUSSION

This study aimed to adapt the PEACH questionnaire into Malayalam to assess the listening skills of children with HL and explore its impact on their functional hearing performance and communication skills in daily life. The questionnaire was administered to 30 parents of children aged 3 to 6 years with moderate to moderately severe HL, fitted with HAs. The children were categorized into two groups based on the age at which they received HA: Group I (fitted before 2 years of age) and Group II (fitted after 2 years of age), both undergoing speech therapy.

Parents were instructed to carefully read and respond to the questionnaire, rating it on a 4-point scale. The findings indicated that children fitted with HA before the age of 2 years exhibited superior performance, reflected in higher scores for quiet, noise, and overall situations, compared to children fitted after 2 years of age, as observed in the Malayalam PEACH questionnaire. The test-retest reliability assessment, conducted on 15 parents after a 4-week interval, demonstrated high reliability of the questionnaire.

These results of the present study is in accordance with previous studies conducted in various languages, including Bengali language (Gupta, et al. 2023),Turkish (Eroglu, 2021), Swedish (Brännström et al., 2014), Malay (Quar, 2012), Brazilian-Portuguese (Levy & Rodrigues, 2016), and Tamil (Kumar et al., 2013). The consistent findings across different linguistic contexts strengthen the validity and reliability of the Malayalam PEACH questionnaire as a tool for evaluating the listening skills of children with HL and its impact on their daily functioning.

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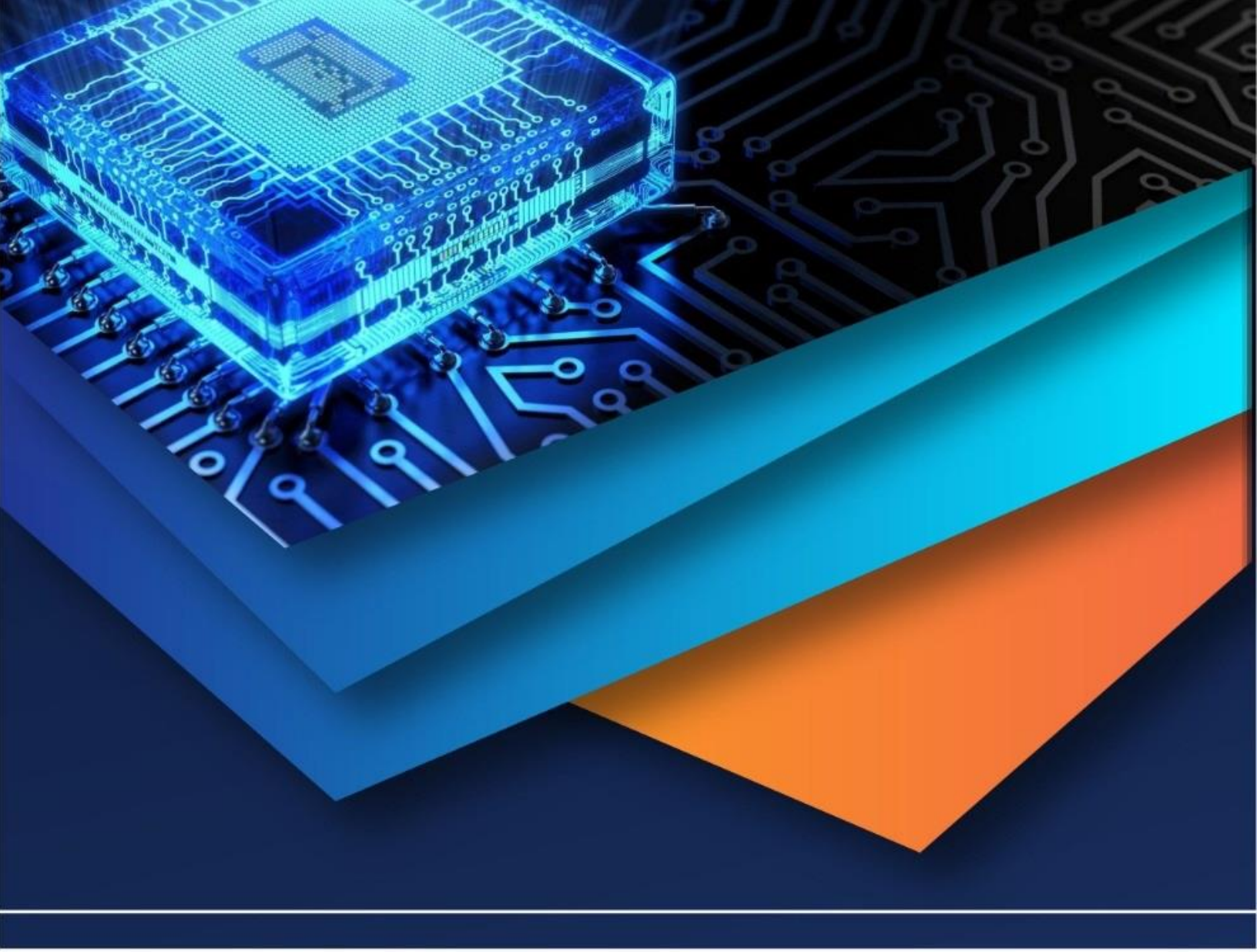

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