Aud Vest Res (2016);25(2):111-118.

RESEARCH ARTICLE

Cultural adaptation and determination of validity and reliability of the Persian version of the parents' evaluation of aural/oral performance of children questionnaire

Fateme Naghibirad[1], Jamileh Fatahi[1,2*], Fahimeh Hajiabolhassan[1], Elham Faghihzadeh[3], Hessamaldin Emamdjomeh[4]

[1]- Department of Audiology, School of Rehabilitation, Tehran University of Medical Sciences, Tehran, Iran

[2]- Department of Audiology, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran

[3]- Department of Biostatistics, School of Allied Medical Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

[4]- ENT and Head & Neck Research Center, Iran University of Medical Sciences, Tehran, Iran

Received: 21 Dec 2015, Revised: 1 Feb 2016, Accepted: 10 Feb, Published: 18 May 2016

Abstract

Background and Aim: Parents' evaluation of aural/oral performance of children (PEACH) questionnaire is used for children within any age group and any amount of hearing loss. The purpose of this study was translation, cultural adaptation, determination of reliability and validity of the questionnaire, and assessment of its scores in children with cochlear implant versus normal group.

Methods: Questionnaire was translated into Persian and was adapted to meet Iranian cultural context. After confirming face validity, the test was given to a group of normal children (n=54) and a group of cochlear implanted users (n=30). It was tested for reliability after two weeks.

Results: Test results showed high Cronbach alpha (0.91) and total inter-class correlation of 0.99 which were higher than respective values in the original version. Significant difference was seen in comparison of scores between children with cochlear implant and normal children (p=0.026).

Conclusion: Persian version of PEACH questionnaire, which is the equivalence of the original version, seems to have high validity and reliability and it is a useful tool for evaluating aural/oral performance of hearing impaired children.

Keywords: Aural/oral performance; reliability; validity; cochlear implant; psychometric evaluation

[*] **Corresponding author:** Department of Audiology, School of Rehabilitation, Tehran University of Medical Sciences, Piche-Shemiran, Enghelab Ave., Tehran, 1148965141, Iran. Tel: 009821-77533939, E-mail: jfatahi@tums.ac.ir

Introduction

Hearing impairment in children affects their learning, attention and communication, and causes retardation in hearing impaired children in comparison with their peers. Children who suffer severe to profound sensorineural hearing loss (SNHL) face difficulties in physiological performance, the development of spoken language and academic achievement [1]. Parents, teachers, clinicians and researchers concur that the acquisition of language in children with severe to profound SNHL severely challenges them [2]. To avoid communication and speech problems, permanent or partially deaf children should receive a hearing aid or a cochlear prosthesis [3]. Even when using hearing aids, the children are unable to recognize some vocal-

phonetic cues necessary for speech recognition [4]. Studies have shown that cochlear implant provides them with a considerable gain in auditory perception and speech generation. Osberger claims that in deaf children, cochlear implant greatly improves the acquisition and use of spoken language and has positive social and mental effects as well. Therefore, the improvement of speech and language skills has been considered a fundamental objective in the children using cochlear implants [5]. Although the acoustic signals generated by a cochlear implant is not as rich and detailed as normal hearing [6], deaf children receiving it before the age of 10 have acquired much better speech generation skill than those receiving it after the age of 10 [7]. Furthermore, they can learn the language faster than their peers [8]. The findings also suggested that having used the cochlear implant for five years, the children were able to achieve a language level close to their peers with normal hearing [9].

Despite numerous assessments of language and speech skills, it is not yet determined what range of lingual ability in a structure texture reflects a child's ability in daily performance, which may explain why children using cochlear implants have different skill levels in different linguistic areas [10]. Hearing impairment and the degree of the loss is predicted by parents and diagnosed through normal hearing tests. However, the amount of problems related to education, communication and attention in children is not normally diagnosed. Thus, there is an urgent need for a program to assess the above items. An appropriate method to measure these disabilities is to use a questionnaire [3]. Common questionnaires that parents of hearing impaired children use include The Meaningful Auditory Integration Scale (MAIS), Infant and Toddler Meaningful Auditory Integration Scale (IT-MAIS), Little EARS Auditory Questionnaire (LEAQ) and PEACH [11].

Parents' evaluation of aural/oral performance of children (PEACH) was designed by Ching and Hill for an actual environment [12]. In order to complete the questionnaire, parents should monitor their child for at least one week and record their observations in 13 situations. The questionnaire, designed to record the way of hearing and communication of a child with a hearing aid or a cochlear implant, is a leaflet for parents, in which they make notes of the behavior and aural responses of the child in different aural situations during a week. The ranking section of the questionnaire consists of 13 questions completed by an audiologist at a meeting with child's parents or nurse [12].

Ching et al. [13] evaluated the daily language capability and aural performance of 133 children with hearing impairment who had received a hearing aid at the age of three. They investigated the children's language ability and aural/oral performance by pre-school language tests and PEACH, respectively. A clear correlation was observed between language evaluations and PEACH such that, on average, the children having language difficulties revealed difficulties in daily aural/oral performance, as well. They observed considerable compatibility between language measurements and the standardized tool of PEACH. They suggested using PEACH for the evaluation of oral/aural performance of children in daily life and this section was considered a valid tool to evaluate usefulness of the hearing aid for children in actual living conditions. Of course, this needs parents' active cooperation, which requires recording their observations instead of checking limited response choices [13]. An advantage of PEACH is that it can be used for the children of any age from one month to the age of school, with all degrees of hearing loss, from mild to profound, and without any differences between genders [14]. It is completed at the beginning of rehabilitation in order to monitor the rehabilitation process. The questionnaire was translated to different languages including Arabic, Malaysian, Chinese, Vietnamese, Italian, Norwegian, Swedish, Indian and Turkish [11,15-17] and has an online version. Quar et al. [16] studied 74 Malaysian children with normal hearing, aged 3 months to 13 years, and investigated the amplification effects of auditory behaviors of children on daily life based on observation of children with PEACH.

Bagatto and Scollie. compared the normalized data obtained from Diary Format PEACH in the study of Ching with the data obtained from a different group of children through Rating Scale Format PEACH [14]. Kumar et al. investigated the language performance of thirty Indian children using cochlear implants through PEACH [11].

Given the high prevalence of hearing loss, its adverse effects on speech and language, increasing number of Iranian cochlear implant centers, and also accomplishment of the effective operation on hard-of-hearing children, the investigation of aural/oral performance in different aural situations of Persian speaking children using cochlear implants is required. Since the first step of using the questionnaire for hard-of-hearing Persian speaking children is to determine the normative data in children, the purpose of this study was to translate the questionnaire into Persian, determine its validity and reliability, and implement it on normal and hard-of-hearing children using cochlear implants.

Methods

This study utilized test development in cross-sectional form. Having obtained permission from the main designer of PEACH, the stages of translation and validation were carried out. The Persian translation of the questionnaire was prepared and localized for Iranian culture. Delphi method was used to qualitatively assess face validity by experts and subjects. Its quantitative assessment was performed on 54 normal individuals and 30 hard-of-hearing cochlear implant users.

Ten expert audiologists and ten participants evaluated each items in terms of reasonability and acceptability to determine its face validity. Cultural adaptation was determined by 10 experts who evaluated each item in terms of importance and relevance. In this step, the translated and main versions were given to ten experts to score the translation quality, intelligibility, and cultural compatibility on the basis of a 100-point scale separately. Then, the panel of experts and researchers discussed the items that were unanimously given low scores to make the final decision. In cases that we had to change some words, the content of the questionnaire has not changed.

Children using cochlear implants and normal children were selected by convenience sampling. Normal children and those with cochlear implants, aged three years and four months to five years and four months, were recruited. The sample consisted of 54 parents of normal children and 30 parents of children with cochlear implants for questionnaire implementtation stage. Normal children were selected from a kindergarten in central area of Tehran with a middle class context, and cochlear implanted children were from Iran Cochlear Implant Center, Iran University of Medical Sciences.

Inclusion criteria for the two groups were mastery of Persian language of children's parents, lack of neurologic problems and having an age from three years and four months (40 months) to five years and four months (64 months). This age range was selected because normal hearing children of 40 months old can obtain the full score of the questionnaire [12]. Specific inclusion criteria for the children using cochlear implants were having severe to profound hearing loss before the surgery, a cochlear implant age of one to two years and at least two years of using a cochlear implant. Inclusion criteria for normal children were the lack of otological and audiological problems based on the otoscopy and pure tone audiometry (a threshold of better than 20 dB in a frequency range of 1 to 4 kHz) and tympanometry (type An).

PEACH includes the following domains: 1) use of undesirable amplification and loudness (including two questions which are investigated only in hard-of-hearing children), 2) hearing and communication in a quiet place, 3) hearing and communication in noise, 4) use of a telephone, 5) responding to sounds in the environment. The questions are on a five-point Likert scale, scoring from zero to four. Each alternative consists of a number and a percentage (from zero to 44 or from zero to 100 percent). The scores of 4, 3, 2, 1 and 0 respectively correspond to more than 75% (always), 75% (often), 50% (sometimes), 25% (rarely) and 0% (never).

The questionnaire has three sections. The first section consists of two questions about hearing aids. The second section is comprised of six questions on quiet places and the third section contains five questions on noisy situations. The first two questions, related to hearing aids, are for hard-of-hearing children. Scores of the questions related to quiet and noisy places constitute respectively section A and B, the sum of which is the total score of responses (Section C, A+B=C).

The necessary explanations on the proposal preparation and on how to respond to questions and uncertainties were clearly presented to participants. Having filled out a consent form, children's parents who were willing to take part in the research project were given the Persian version of PEACH and supplementary booklet regarding how to respond. In order to complete the questionnaire, parents were asked to monitor their child for at least one week and record their observations in a special PEACH booklet to respond to 11 situations in normal children and 13 situations in the cochlear-implant users. After a week, the questionnaire ranking section was answered in a meeting attended by parents and an audiologist.

In order to determine the face validity, the quantitative method of Lawshe was used. In order to determine the questionnaire reliability through retest, a number of parents after two weeks were asked to monitor the child for another week and complete the Persian version again. Then, parents responded to the ranking questions of the questionnaire in a meeting attended by researchers. Paired t-test and intra-class correlation (ICC) were used to investigate the reliability and Cronbach's alpha was used for internal consistency. For discriminate validity and comparison between normal and cochlear implanted children, independent t-test was used. Standard error of measurement (SEM) and smallest detectable change (SDC) parameters were calculated using the following formula:

$$\mathrm{SEM} = \mathrm{S} \times \sqrt{1 - \mathrm{ICC}} \qquad \mathrm{SDC} = 1.96 \times \sqrt{2} \times \mathrm{SEM}$$

The data were processed in SPSS19.

Results

Results indicate the high quality of translations, the ability to understand the questionnaire, and also showed high compliance of Persian version with Iranian culture. In a final review session, in order to examine the validity of the Persian translation of items that were disputed by experts or have been given lower scores, these items were discussed and some words were completely changed without any alteration of the content. For example, the phrase "drinking tea" was used instead of "drinking coffee" and the name of "Olivia" was replaced by "Ali" which is more common in Iran. Audiology experts assessed the quality of the translation, the ability to understand and cultural adaptation with a 100-point scale as 99.15, 99.30 and 98.69, respectively. Questionnaire survey was evaluated by experts as well as target group (10 expert audiologists and 10 participants). They evaluated each item in terms of reasonability and acceptability to determine its face validity. Results indicate the high acceptability of the questionnaire.

In the phase of implementation and checking the reliability of the questionnaire the whole sample consisted of 84 children of whom 54 (64.3%) had normal hearing and 30 (35.7%) were cochlear implant users. Normal children were comprised of 31 males (57.4%) and 23 females (42.6%). Furthermore, the number of males and females in the children using cochlear implants were both equal to 15 (50%). The mean age of normal children was 55.64 (SD=10.70) months (range: 37 to 72 months). In addition, the mean age of the children using cochlear implants was 53.10 (SD=10.52) months (range: 36 to 72 months). The children with hearing impairment, whose motor development was normal and age proportionate, had no defects but hearing loss. They had experienced hearing aids and attended auditory training classes for 3-6 months before the cochlear implant surgery, and all used Nucleus freedom prosthesis.

Results of test and retest including descriptive statistics of overall score, quiet and noisy section scores of Persian PEACH in normal hearing children and cochlear implant users are

Table 1. Descriptive statistics of the total score and the scores of the questionnaire subscales in normal hearing children and cochlear implant (CI) users in test-retest

		Test				Retest			
		Normal (n=54), CI user (n=30)				Normal (n=15), CI user (n=15)			
Group	**Score**	**Mean (SD)**	**%**	**Min**	**Max**	**Mean (SD)**	**%**	**Min**	**Max**
Normal									
	Silent	21.86 (1.88)	91.08	15	24	21.93 (1.83)	91.37	18	24
	Noise	16.80 (2.14)	84.00	12	20	17.20 (1.89)	86.00	12	20
	Total	38.66 (3.35)	78.87	28	44	30.13 (3.18)	88.93	30	44
CI user									
	Silent	17.80 (4.58)	74.16	9	25	17.80 (4.57)	74.00	10	24
	Noise	14.40 (3.60)	72.00	7	20	14.53 (3.68)	72.65	8	20
	Total	32.2 (8.03)	73.18	17	44	32.33 (8.05)	73.47	18	44

shown in Table 1. Kolmogorov-Smirnov test results show that none of the variables demonstrated any serious deviation from normality, except for variables of the noisy setting section in normal children and variables of the quiet-setting section in children using cochlear implants. The values of Cronbach's alpha revealed that different parts of the test are consistent and measure a single feature; thus, the test has a high internal consistency (Table 2). The Cronbach's alpha for the total score in normal individuals and cochlear implant users were 0.91 and 0.90, respectively.

In normal children, high correlation and ICC between test and retest for total score and scores of the subscales (the quiet and noisy sections) were observed which were 0.99, 0.98 and 0.99, respectively (Table 2). Test-retest correlation coefficient in the control group showed a high correlation between the two implementations ($p<0.0001$).

A high correlation and ICC were observed in cochlear implant users between the test-retest for the total score and scores of the subscales (the quiet and noisy sections) that were 0.99, 0.97, 0.99, respectively (Table 2). The values of correlation coefficients of the test-retest also showed a high and significant correlation between test-retest ($p<0.001$).

The SDC of Persian version of the PEACH questionnaire for the total score in normal individuals was approximately 2.5. This indicates that a change of 2.5% in the total score must happen to indicate the alteration on normal children aural/oral performance is occurring. SDC for the total score in cochlear implant users was near 3.4 that means for any significant change in aural/oral performance of hard of hearing children, 3.4% of change in the total score must be observed.

In the normal hearing children group and cochlear implant users group, the result of the paired t-test showed that there was no statistically significant difference between the quiet and noisy settings in terms of the mean overall score in test-retest. When determining the correlation coefficient between the scores of different sections of the questionnaire, a significant correlation was seen between all studied variables in the normal children group ($p<0.001$), and the highest correlation (0.868) was seen between the scores of the total and noisy section. In the group of children using cochlear implants, the result of Pearson's correlation test indicated that there is a significant correlation between age and the overall score ($p<0.001$).

According to Table 1, the total score was respectively equal to 38.67 (SD=3.35) and 32.20

Table 2. Intra-class correlation (ICC) test, Cronbach' alpha, standard error of measurement (SEM) and smallest detectable change (SDC) in normal children (n=54) and cochlear-implant (CI) users (n=30)

Group	Items	ICC	Lower limit	Upper limit	p	Cronbach' alpha	SEM	SDC
Normal children								
	Silent	0.99*	0.98	0.99	0.001	0.86	0.10	0.29
	Noise	0.98**	0.95	0.99	0.001	0.82	0.15	0.43
	Total	0.99*	0.98	0.99	0.001	0.90	0.89	2.48
CI users								
	Silent	0.99**	0.98	0.99	0.001	0.84	0.40	1.09
	Noise	0.97*	0.98	0.95	0.001	0.80	0.19	0.53
	Total	0.99*	0.97	0.99	0.001	0.91	1.21	3.36

*Pearson
**Spearman

(SD=8.37) in the groups of normal hearing children and cochlear implant users. The t-test showed a significant difference between mean scores (p=0.026). The mean scores of the quiet places (p=0.004) and noisy situations (p=0.316) indicated a statistically significant difference between the two groups of normal and hard of hearing children.

Discussion

After translating the PEACH to Persian and assessing its face validity and reliability, its scores were examined in hard-of-hearing children using cochlear implants. Good face validity was confirmed after experts and participants approved the quality of translation, intelligibility, cultural adaptation and fluency of the Persian version of the questionnaire. The results are compatible with the face and content validity of the main questionnaire [12] as well as other translations to Malay, Swedish, and Indian [11,15-17], which indicates the fluency and applicability of the questionnaire items.

In this study, the comparison of mean overall score in the normal children with a score of 38.667 (SD=3.35) and the cochlear implant users with a score of 32.300 (SD=8.37) indicated a significant difference between the two groups. This is similar to the results gained from the main version of the questionnaire with a score of 62.9% (SD=14.9%) and indicates a difference in the oral/aural ability among children with normal hearing and hard-of-hearing.

A high ICC was obtained between the test-retest for the total score and the scores of the questionnaire subscales (the quiet and noisy sections) in normal children and the children using cochlear implants (Table 2). There was no significant difference between the scores of the test-retest, which indicates the high reproducibility of the Persian version of the questionnaire. This finding is in line with the findings of the main version of the questionnaire [12] and other translations of the questionnaire by Quar et al. in Malaysia [16], Kumar in India (Tamil) [11], Brännström in Sweden [15] and Emerson in Tamil [17].

In the present study, the high internal consistency of the questionnaire was approved with a Cronbach's alpha of 0.86, 0.82 and 0.90 for the scores of the quiet place, noisy place and the total score, respectively for normal children and of 0.84, 0.80 and 0.91 for the children using cochlear implants. This is higher than the Cronbach's alpha reported for the main version of the questionnaire for both normal and hearing impaired children, being respectively 0.76, 0.79 and 0.88 [12], and close to the overall score of 0.93 obtained for the Malay translation of the questionnaire [16].

Normal subjecsts

Bagatto and Scollie compared the data normalized for Diary Format PEACH in the study of Ching with the data obtained from a different group of children using Rating Scale Format PEACH [14]. In this study, 95 children with normal hearing (2 to 83 months old) participated along with their parents, for whom the ranking section version of PEACH was completed. There was a close concurrence between the data obtained from this study and the norms available in the Diary Format PEACH, the scores of the two genders were not different, and the data had a good internal consistency. Furthermore, the age-dependency in the Diary Format PEACH was true in this study such that lower scores were obtained for children of 20 months and younger [14].

Quar et al. studied 74 Malaysian children, aged 3 months to 13 years, with normal hearing and investigated the effect of strengthening auditory behavior in children in daily life based on the observation of children with PEACH. The results had a high internal consistency with a Cronbach's alpha of 0.93. The overall score was 64.5% (SD=14.7%), which was close to the overall score of 62.9% (SD=14.9%) in the main version. There was no significant difference between the overall scores for both sexes in the Malaysian questionnaire. Moreover, similar to the English version, close-to-perfect scores were obtained for the children with the age range of close to 40 months in this questionnaire [16].

Cochlear implant users

In the present study, Pearson's correlation test showed a significant correlation between age and the overall score (0.751, $p<0.0001$), because the subjects received cochlear implant at the age of one to two years old and naturally their higher age indicated longer use of cochlear prostheses. Therefore, in cases that cochlear prosthesis is used for longer time, higher scores will be obtained in the questionnaire. These results concur with those of Kumar et al., in which the children implanted before and after the age of two received respectively a score of 30.8 (SD=0.98) and 21.13 (SD=0.27), which indicated a significant difference between the two groups and demonstrated that lower age of receiving the implant and the longer use increase the score.

Using PEACH, Kumar et al., examined language performance of 30 Indian children using cochlear implants in two groups of 15 subjects. The first and the second group respectively consisted of those receiving the cochlear device earlier than the age of 2 (earlier implanted group, EIG) and at the age of 3 to 4 (later implanted group, LIG). The total scores of the EIG and LIG were calculated as 30.8 (SD=0.98) and 21.13 (SD=0.27), respectively. Although both groups suffered language problems, the results of the language performance of group 1 were better than group 2. In addition, a significant correlation was seen between age at intervention and the score of the PEACH. As a result, PEACH can be used as a clinical tool to obtain meaningful information about children's hearing performance in real life [11]. The present study investigated the performance of the children implanted earlier than the age of two with a score of 32.200 (SD=8.37), which is close to the EIG group in the study of Kumar and indicates the effectiveness of the cochlear implant in young ages.

A limitation of this study was the unwillingness of parents to cooperate in the research and lack of cooperation in the completion of PEACH in the test-retest. Other studies using larger samples, especially individuals in hearing aid group, and comparative surveys between different types of cochlear implants or different strategies of processors are suggested.

Conclusion

The results of this study demonstrated that the Persian questionnaire has appropriate validity and reliability. In addition, the test had a high internal consistency and the coefficient of repeatability. In the group of the children using cochlear implants, there was a significant correlation between age at receiving the cochlear prosthesis and the overall score; making it suitable to evaluate the oral/aural performance of cochlear implanted children in hearing clinics. In addi-

tion, a significant difference was seen when comparing the questionnaire scores of the hard-of-hearing children using cochlear implants with their normal peers, which can be used as a tool for prediction of oral/aural performance of the children using cochlear implants.

Acknowledgements

This study was extract of F. Naghibirad dissertation which supported by Tehran Univercity of Medical Sciences (TUMS) with grant number 93-04-32-277299. Hereby, we appreciate from Ms. Ashraf Rezaei manager of Mehr- e- Arian kindergarten for their cooperation during the sampling process and we also thank all the parents for their cooperation.

REFERENCES

1. Nelson HD, Bougatsos C, Nygren P; 2001 US Preventive Services Task Force. Universal newborn hearing screening: systematic review to update the 2001 US Preventive Services Task Force Recommendation. Pediatrics. 2008;122(1):e266-76.
2. Duchesne L, Sutton A, Bergeron F. Language achievement in children who received cochlear implants between 1 and 2 years of age: group trends and individual patterns. J Deaf Stud Deaf Educ. 2009;14(4):465-85.
3. King AM. The national protocol for paediatric amplification in Australia. Int J Audiol. 2010;49 Suppl 1:S64-9.
4. Niparko JK, Tobey EA, Thal DJ, Eisenberg LS, Wang NY, Quittner AL, et al. Spoken language development in children following cochlear implantation. JAMA. 2010;303(15):1498-506.
5. Fink NE, Wang NY, Visaya J, Niparko JK, Quittner A, Eisenberg LS, et al. Childhood development after cochlear implantation (CDaCI) study: design and baseline characteristics. Cochlear Implants Int. 2007;8(2):92-116.
6. Geers AE, Nicholas JG, Moog JS. Estimating the influence of cochlear implantation on language development in children. Audiol Med. 2007;5(4):262-73.
7. Tait M, Lutman ME. The predictive value of measures of preverbal communicative behaviors in young deaf children with cochlear implants. Ear Hear. 1997;18(6):472-8.
8. Dettman SJ, Pinder D, Briggs RJ, Dowell RC, Leigh JR. Communication development in children who receive the cochlear implant younger than 12 months: risks versus benefits. Ear Hear. 2007;28(2 Suppl):11S-18S.
9. Hermans D, Knoors H, Ormel E, Verhoeven L. Modeling reading vocabulary learning in deaf children in bilingual education programs. J Deaf Stud Deaf Educ. 2008;13(2):155-74.
10. Hayes H, Geers AE, Treiman R, Moog JS. Receptive vocabulary development in deaf children with cochlear implants: achievement in an intensive auditory-oral educational setting. Ear Hear. 2009;30(1):128-35.
11. Kumar S, Rout N, Kumar N, Chatterjee I, Selvakumaran H. Performance of Indian children with cochlear implant on PEACH scale. ISRN Otolaryngol. 2013;2013:565096.
12. Ching TY, Hill M. The Parents' evaluation of aural/oral performance of children (PEACH) scale: normative data. J Am Acad Audiol. 2007;18(3):220-35.
13. Ching TY, Crowe K, Martin V, Day J, Mahler N, Youn S, et al. Language development and everyday functioning of children with hearing loss assessed at 3 years of age. Int J Speech Lang Pathol. 2010;12(2):124-31.
14. Bagatto MP, Scollie SD. Validation of the parents' evaluation of aural/oral performance of children (PEACH) rating scale. J Am Acad Audiol. 2013;24(2):121-5.
15. Brännström KJ, Ludvigsson J, Morris D, Ibertsson T. Clinical note: validation of the swedish version of the parents' evaluation of aural/oral performance of children (PEACH) rating scale for normal hearing infants and children. Hearing Balance Commun. 2014;12(2):88-93.
16. Quar TK, Ching TY, Mukari SZ, Newall P. Parents' evaluation of aural/oral performance of children (PEACH) scale in the Malay language: data for normal-hearing children. Int J Audiol. 2012;51(4):326-33.
17. Emerson LP. Pilot study to evaluate children with hearing aids through PEACH and TEACH in a rural community. Egyptian Journal of Ear, Nose, Throat and Allied Sciences. 2015;16(2):133-7.