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Assess the effectiveness of computer assisted teaching programme on knowledge regarding early detection of hearing impairment in infants among mothers in a selected community in Bangalore

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Abstract

Background of the study: Hearing loss is not being able to hear sound in one or both ears. Infants may have some hearing loss at birth. Hearing loss can also develop in children who had normal hearing as infants. The loss can occur in one or both ears. It may be mild, moderate, severe, or profound. Profound hearing loss is what most people call deafness. Sometimes hearing loss gets worse over time. Other times it stays stable and does not get worse.

Signs of hearing loss in infants vary by age. A newborn baby with hearing loss may not startle when there is a loud noise nearby. Older infants, who should respond to familiar voices, may show no reaction when spoken to. Children should be using single words by 15 months, and simple 2-word sentences by age 2. If they do not reach these milestones, the cause may be hearing loss. Early identification followed by prompt and appropriate management can effectively reduce the impact of deafness and hearing loss on the life of an individual. Neonatal and Infant hearing screening programmers are an effective strategy for early intervention in cases of congenital and early onset hearing loss. Objectives: To determine the effectiveness of computer assisted teaching programme on knowledge regarding early detection of hearing impairment in infants.

The objectives of the study were: To assess the pre-existing knowledge regarding hearing impairment and early detection of hearing impairment in infants among the mothers staying in selected community. To develop a computer assisted teaching module for the early detection of hearing impairment in infant. To compare the pre and post existing level of knowledge on early detection of hearing impairment among the mother in a selected community. To associate the pre-test knowledge regarding early detection of hearing impairment in infant among the mothers staying in selected community with their selected demographic variable.

Methods: An evaluative approach was adopted and a pre experimental design was used for the study. Infant mothers who came to Kannalli PHC Bangalore were the samples and the sample size was 40. Infant mothers were selected by non-probability convenience sampling.

Result: The data obtained were analyzed using descriptive inferential statistics in terms of frequencies, percentages, mean, mode, SD and Chi-square't' value.

Sample characteristic in pretest revealed that 95% of mothers were inadequate knowledge; only 5% of mothers were having moderate knowledge and none of mother reported the exposure to literature on EDHI adequately.

From the findings of the study it was clear that the mean posttest knowledge score 17.5 with SD of 2.28 was significantly higher than the mean pretest knowledge scores 5.67 with SD of 1.8 and computed paired 't' value 28.52 is higher than table value 2.02 at p0.05 level. There was significant association found between the pre test knowledge score of mothers with their post test knowledge score.

The study reveals that there is no significant association between selected demographic variables like age, education, religion, residential area, family income, parity, previous knowledge and source of knowledge in relation with pre-test Knowledge scores of post natal mothers at p0.05.

The present study attempted to assess the effectiveness of CATP regarding EDHI and found that the developed CATP was effective in improving the knowledge of infant mothers regarding EDHI in infant and its management.

Keywords: Effectiveness, CATP, computer assisted teaching programme, EDHI, Early detection of hearing impairment in infant

1. Introduction

Hearing, medically defined as the act or power of apprehending sound one of the special senses of vertebrates that is concerned with the perception of sound, is mediated through the organ of Corte of the ear in mammals, is normally sensitive in humans to sound vibrations between 16 and 27,000 hertz but most receptive to those between 2000 and 5000 hertz, is conducted centrally by the cochlear branch of the auditory nerve, and is coordinated especially in the medial geniculate body [1].

The basic function of the hearing mechanism is to gather, conduct and perceive sounds from the environment. Sound waves, propagated through an elastic medium, liberate energy in a characteristic pattern which varies in frequency and intensity. The human voice and other ordinary sounds are composed of fundamental tones modified by harmonic

overtones. Our harmonic sensitivity is greatest in childhood [2].

From the birth baby will pay close attention to sound and voice, especially high pitched one. Baby will also respond to familiar noise. By 3 months the temporal lobe which helps in hearing, language and smell will be more receptive and active. When baby hear mother's voice, may look directly at mother and gurgle. From 4 month baby will react excitedly to sound and may smile when hears mothers voice. Baby starts watching mother mouth intently when she speak, and try to copy and make sounds. At 6 or 7 months baby will realize where sounds come from and turn quickly to respond. By 12 month baby will be able to recognize her favorite songs, and will try to join in [3].

Hearing loss is not being able to hear sound in one or both ears. Infants may lose all of their hearing or just part of it. Although it is not common, some infants may have some hearing loss at birth. Hearing loss can also develop in children who had normal hearing as infants. The loss can occur in one or both ears. It may be mild, moderate, severe, or profound. Profound hearing loss is what most people call deafness. Sometimes hearing loss gets worse over time. Other times it stays stable and does not get worse [4].

Hearing loss may occur when there is a problem in the outer or middle ear. These problems may slow or prevent sound waves from passing through. They include Birth defects that cause changes in the structure of the ear canal or middle ear, buildup of ear wax, buildup of fluid behind the eardrum, injury to or rupture of the eardrum, objects stuck in the ear canal, scar on the eardrum from many infections. And sometimes it is congenital [4].

Signs of hearing loss in infants vary by age. A newborn baby with hearing loss may not startle when there is a loud noise nearby. Older infants, who should respond to familiar voices, may show no reaction when spoken to. Children should be using single words by 15 months, and simple 2-word sentences by age 2. If they do not reach these milestones, the cause may be hearing loss [4].

Hearing loss makes a baby unable to hear sounds below a certain level. A baby with normal hearing will hear sounds below that level. The health care provider will examine your child. The exam may show bone problems or signs of genetic changes that may cause hearing loss. The doctor will use an instrument called an otoscope to see inside the baby's ear canal. This allows the doctor to see the eardrum and find problems that may cause hearing loss. Two common tests are used to screen newborn infants for hearing loss: Auditory brain stem response test. This test uses patches, called electrodes, to see how the auditory nerve reacts to sound. Otoacoustic emissions test. Microphones placed into the baby's ears detect nearby sounds. The sounds should echo in the ear canal. If there is no echo, it is a sign of hearing loss. Older babies and young children can be taught to respond to sounds through play. These tests, known as visual response audiometry and play audiometry, can better determine the child's range of hearhearing [4].

No single treatment or intervention is the answer for every child or family. Good intervention plans will include close monitoring, follow-ups and any changes needed along the way. There are many different options for children with hearing loss and their families. Some of the treatment and intervention options include: Working with a professional (or team) who can help a child and family learn to communicate. Getting a hearing device, such as a hearing aid. Joining support groups. Taking advantage of other resources available to children with a hearing loss and their families [5].

Early identification followed by prompt and appropriate management can effectively reduce the impact of deafness and hearing loss on the life of an individual. WHO has developed training resources to enable health workers to prevent, detect and manage ear and hearing disorders? Neonatal and Infant hearing screening programmers are an effective strategy for early intervention in cases of congenital and early onset hearing loss [6].

Infants identified with hearing loss can be fit with amplification at as young as 4weeks of age. With appropriate early intervention, children with hearing loss can be mainstreamed in regular elementary and secondary education classrooms. Recent research has concluded that children born with a hearing loss who are identified and given appropriate intervention before 6 months of age demonstrated significantly better speech and reading comprehension than children identified after 6 months of age [6].

Experience shows that those who can hear are only occasionally prepared to grant individual deaf persons full access to spoken communication. Hearing impairment is a silent disease in two senses. First, those who are afflicted hear silence; second, they remain silent, not owning up to their hearing disorder. They withdraw into communicative isolation and the hearing–speech cycle is broken [7].

The WHO global estimate for disabling hearing impairment (of a degree of severity >40 dBHL) has more than doubled from 120 million people in 1995 to at least 278 million in 2005. Two-thirds of individuals with hearing impairment live in developing countries, and hearing impairment in 68 million people is estimated to have originated from childhood. About two to four babies per 1,000 live births are born annually in developed countries with permanent or sensorineural hearing impairment and this range may extend to six per 1,000 live births within the neonatal period in developing countries. Permanent hearing impairment is an etiologically heterogeneous trait attributable to genetic and environmental causes, half of which are probably preventable [8].

Approximately 4000 new cases of sudden deaf occur each year in the United State only 10 to 15 percent of patient will sudden deafness know what caused their hearing loss 2 to 3 out of every 1000 children who are born deaf and born to parent who can hear. There may be more than 700 million people with hearing loss world wide by 2014. It is estimated that out of 600 million hearing impaired throughout the world 400 million live in developing countries. Approximately ½ of these cases of hearing loss could be prevented, however people in these developing countries have limited information about the access and health care [12].

Every day in the United States 33 babies are born with permanent hearing loss. Approximately 1 in 1,000 newborns are born profoundly deaf with another 2-3 out of 1,000 babies born with partial hearing loss, making hearing loss one of the most common birth defects in America. In the United States, 12,000 babies are born annually with some form of hearing loss, only half exhibit a risk factor – meaning that if only high-risk infants are screened, half of the infants with some form of hearing loss will not be tested and identified. In actual implementation, risk-based

newborn hearing screening programs identify only 10 - 20% of infants with hearing loss. The majority of children with hearing loss are born into families who have little or no experience with hearing loss [9].

In India significant hearing loss is one of the most common major abnormalities present at birth. If undetected, it will impede speech, language and cognitive development. Significant bilateral hearing loss is present in 1 to 3 per 1000 new born infants in the well-baby nursery population and in 2 to 4 per 100 infants in the intensive care unit population. It is an established fact that if hearing loss is present it should be detected and remediated before the baby is 6 months old. Over the period of 7 years from January 2003 till December 2009, screened a total of 10,165 babies and the incidence of hearing loss as per our observation in the high risk group is 10.3 per 1000 and 0.98 per 1000 in the well baby group [11].

In India with a population of more than 700 million, has more than 800,000 people who are hearing impaired. The prevalence of hearing impairment are 66 per 100,000 new born. It is estimated that Indian Sign Language is used by over 1,000,000 deaf adult and by approximately 500,000 deaf children [13].

According to Annual Report (2010- 2011) of Ali Yavar Jung National Institute for the Hearing Handicapped, Karnataka have high level of prevalence of hearing impairment that was 273 per 100,000 population [14].

Late identification of hearing loss or lack of early intervention services can negatively impact speech and language development, academic achievement, and social-emotional development. The most critical time for stimulating the hearing centers in the brain is during the first few months of life. Between a deaf infant and his or her parent early visual communication does exist. In fact, one of the greatest difficulties in diagnosis of hearing impairment lies in this early communication. Deaf infants are responsive to visual stimulation as well as to vibratory stimulation. Hearing parent frequently confuse response to visual stimulation or vibratory stimulation with responses to vocal stimulation [9, 10].

The Joint Committee on Infant Hearing and U.S. Public Health Service's Healthy People 2010 health objectives and A National Institutes of Health (NIH) Consensus Panel in 1993 recommend that all newborns be screened for hearing loss by 1 month of age, have diagnostic follow-up by 3 months, and receive appropriate intervention services by 6 months of age [9].

Lack of knowledge regarding congenital hearing impairment and acquired hearing impairment major contributing factors of this increased incidence of hearing impairment. Hence the investigator felt that the knowledge of the mother has to be assessed and they must be reinforced regarding causes and early detection of hearing impairment in infants.

2. Methods and materials

2.1 Design and setting: A community based pre-experimental, one group pre-test and post test design study was conducted with objectives To assess the pre-existing knowledge regarding early detection of hearing impairment in infant among the mothers staying in selected community. To develop a computer assisted teaching module for the early detection of hearing impairment in infant. To determine the effectiveness of computer assisted teaching programme by comparing the pre and post test level of knowledge of infant mothers on early detection of hearing impairment in infants. The study was conducted in Kannahalli primary health center, Bangalore, Karnataka, India in December 2014.

2.2 Sample and sampling techniques: A non-probability convenience sampling technique was adopted to select the samples. the sample size was 40 infant mothers. In this study age, religion, education, occupation, type of family, family income, age of marriage, type of marriage, age of the child, previous delivery, family income, previous knowledge and source of information are demographic variables, and computer assisted teaching program is the independent variable. Whereas score on knowledge test was dependent variable.

2.3 Data collecting: A pre test was conducted on knowledge regarding early detection of hearing impairment in infant among mothers using 30 item structured knowledge questionnaire prepared by reviewing various research and text book, after checking the reliability of tool. Followed by administration of computer assisted program on early detection of hearing impairment in infant. A post test was conducted by using the same questionnaire by lapse of 7 days.

2.4 Data analysis: After data collection each questionnaire was checked for completeness, and data was analysed by using manual methods. Demographic proforma containing the sample characteristics was analysed using frequency and percentage. The knowledge regarding early detection of hearing impairment in infant among mothers before and after administration of computer assisted program was calculated using mean, and mean percentage, and standard deviation. the significant difference between the mean pre-test and post test knowledge score was calculated using paired 't' test. The association between selected demographic variable and the pre test knowledge score regarding early detection of hearing impairment in infant among mothers was determined by Chi-square test. Level of significance was set at a level of 0.05 to interpret the hypotheses and finding. Based on the reviews of various research article the knowledge score operationally define as adequate above 60%, 31-60% as moderate, and 0-30% as inadequate.

2.5 Ethical consideration: The proposal was approved by Ethical Review Committee of Prajwal College of Nursing. Verbal and written consents was obtained from the study subjects after explaining the study objectives and procedure and their right to refuse to participate in the study any time they want to. For this purpose, a one page consent letter was attached to the cover- page of each questionnaire stating about the general purpose of the study and issues of confidentiality which was discussed by data collectors before filling the questionnaire and proceeding with the interview.

3. Result

Demographic characteristics of the study participants: Forty infant mothers were participated in the study. Below table depict that 42% of infant mothers were in the age group of 21-25years35% were hindu and 35% were Christian.

Regarding the educational status 55% mother were had primary education and 80% of mother were housewife. Most of them (55%) had infant aged 10- 12years. Only 5% of mother basic information regarding early detection of hearing impairment from health professionals and family members.

Table 1: Distribution of the mothers according to their baseline characteristics. N=40

	Variable	Frequency	Percentage
Age in year	15-20	16	40
	21-25	17	42.5
	26-30	7	17.5
	31-44	0	0
Religion	Hindu	14	35
	Muslim	12	30
	Christian	14	35
	Other	0	0
Educational status	Illiterate	5	12.5
	Primary education	22	55
	Secondary education	13	32.5
	Above graduation	0	0
Occupation	House wife	32	80
	Self-employee	7	17.5
	Private employee	1	2.5
	Government employee	0	0
Age of the child	10-15 months	22	55
	7-9months	14	35
	4-6 months	4	10
	0-3 months	0	0
Have you know about early detection of hearing impairment	Yes	2	5
	No	38	95
If yes, source of information	Health professionals	1	2.5
	Family members	1	2.5
	Friend	0	00
	Mass media	0	

Section II: Analysis of pre-test scores of knowledge regarding early detection of hearing impairment in infant among mothers

Table 2: Assessment of pre-test knowledge score regarding early detection of hearing impairment in infant among mothers. N=40

Level of knowledge	Percentage range of score	Frequency	Percentage
Inadequate	0-29%	38	95
Moderate	30-59%	2	5
adequate	60-100%	0	0

The data in table show that majority of the respondent 38 (95%) had inadequate knowledge regarding early detection of hearing impairment in infant followed by 2(5%) respondent who had moderate knowledge and none of them had adequate regarding early detection of hearing impairment.

Table 2.1: analysis of the pre-test score of knowledge regarding early detection of hearing impairment in infant. N=40

Aspect of knowledge	Maximum possible score	Mean	Standard deviation	Mean percentage
About general information	17	2.32	0.95	13%
About early detection of hearing impairment in infant	13	3.35	1.68	25%
Over all knowledge	30	5.67	1.8	18.9%

The above table reveals that the total mean percentage of the pre-test knowledge score was 18.9% with total mean and standard deviation 5.67 and 1.8 respectively.

Section III: analysis of the post-test score of knowledge regarding early detection of hearing impairment in infant among mothers in selected community in Bangalore.

Table 3: Assessment of post-test score of knowledge regarding early detection of hearing impairment in infant among mothers. N=40

Level of knowledge	Percentage range of score	Frequency	Percentage
Inadequate	0-29%	0	0
Moderate	30-59%	18	45
adequate	60-100%	22	55

The data in table 3 depicts that 18 respondents or 45 % of respondents gained moderate knowledge regarding early detection of hear impairment in infant and 22 respondents or 55% respondents gained adequate knowledge regarding early detection of hearing in infant. There was no respondent with inadequate knowledge.

Table 3.1: Analysis of post-test scores of knowledge regarding early detection of hearing impairment in infant among mothers in selected community. N=40

Aspect of knowledge	Maximum possible score	Mean	Standard deviation	Mean percentage
About general information	17	9.8	1.69	57%
About early detection of hearing impairment in infant	13	7.7	1.48	59%
Over all knowledge	30	17.5	2.28	58%

The table 3.1 reveals that the total mean percentage of the post-test knowledge score was 58% with total mean and standard deviation of 17.5 and 2.28 respectively.

Section IV: Evaluation of effectiveness of computer assisted teaching programme on early detection of hearing impairment in infant among mothers

Table 4: Effectiveness of computer assisted teaching programme Difference between pre-test and post-test scores of knowledge regarding early detection of hearing impairment in infants. N=40

Sl. No.	Aspects of knowledge	Pretest		Post test		paired 't' value	P value
		Mean	SD	Mean	SD		
1.	About general information	2.32	0.95	9.8	1.69	24.75*	P<0.05
2.	About early detection of hearing impairment in infants	3.35	1.68	7.7	1.48	10.91*	P<0.05
3.	Over all knowledge	5.67	1.8	17.5	2.28	28.52*	P<0.05

Note: *- Significant at 5% level for 39 df (i.e. P<0.05)

The data presented in Table 4 show that the mean post- test knowledge score regarding early detection of hearing impairment in infant were higher than the mean pre-test knowledge scores. The obtained't' value is also higher than the table value indicating significant difference between the pre-test and post-test scores regarding knowledge on early detection of hearing impairment in infant.

Section V: Association between pre-test score of knowledge regarding early detection of hearing impairment in infant among mothers in selected community with selected demographic variables.

There was no significant association between pre-test score of knowledge regarding early detection of hearing impairment in infant among mothers in selected community in Bangalorein Karnataka, India with their selected demographic variables.

4. Discussion

The present study was conducted to evaluate the effectiveness of computer assisted teaching programme regarding early detection of hearing impairment in infant among the infant mothers.

In the pretest the overall mean knowledge score obtained by the subject was 5.67(18.5%) with standard deviation of 1.8 in pretest. The level of knowledge distribution revealed that majority of the subjects 38(95%) had inadequate knowledge and 2 (5%) had moderate knowledge regarding the early detection of hearing impairment in infant, there was a need for imparting knowledge to the mother to improve their knowledge in hearing impairment and early detection hearing impairment in infant. Thus the investigator assumes that there is a need for imparting knowledge to all the mothers. Hence it was necessary for the investigator to improve the participant's knowledge by giving computer assist teaching programme.

In the post test the overall mean knowledge score obtained by the subjects was 17.5(58%) with standard deviation of 2.28. the level of knowledge distribution revealed that 18(45%) had moderate knowledge and 22 (55%) had adequate knowledge regarding early detection of hearing impairment in infant. The finding revealed that the mean post test knowledge score 58% were significantly higher than the mean pre test score 18.9% suggesting that the computer assisted teaching programme is effective in increasing the knowledge of mothers.

The overall mean knowledge score (58%) obtained by the mother in the post test was higher than the mean knowledge score (18.9%) in the pretest and with the gain in mean score knowledge percentage of 39.1%. There was significant difference between the pre and post test knowledge score with the 't' value of 28.52 and found to be significant at the level of $p< 0.05$ revealing the effectiveness of computer assisted teaching programme on early detection of hearing impairment in infant conducted on 40 infant mothers in Bangalore.

The study finding also reveals that there was no significant association between pre-test knowledge regarding early detection of hearing impairment in infant among mothers with their demographic variables.

5. Recommendations

Based on the findings of the study the following recommendations are forwarded.

- A similar study can be undertaken by utilizing other domains like attitude and practice.
- A descriptive study may be conducted to describe all the aspects of early detection of hearing impairment in infant.
- An explorative study may be conducted to identify the awareness, knowledge, practice and attitude among health personnel regarding the early detection of hearing impairment in infant.
- A similar study can be conducted using a large sample and different study setting.
- A comparative study can be done to assess the knowledge, attitude and practice regarding early detection of hearing impairment in infants among mothers.

6. Implication of the study

The findings of the study have the following implications in the areas of nursing practice, nursing education, nursing administration and nursing research.

6.1 Nursing practice

Health education is an important tool of health care agency. It is one of the most cost effective interventions. Nurses are key persons of health team that play a major role in the health promotion and maintenance. It is a practicing profession, so that the researchers generally integrate finding into the practice. Nurses can conduct health education for mothers in PHC and community health center during their stay that will help in improvement of knowledge for both nurses and mothers

6.2 Nursing education

The present study emphasizes on effectiveness of CAT on knowledge regarding the early detection of hearing impairment in infants and encourages the mothers to observe any abnormalities related to hearing and seek appropriate health care. In order to achieve this, the health centre should include health teaching to mother on care of the baby.

6.3 Nursing administration

The study assists in the nursing administrative authorities to initiate and carry out health education programme in primary health care settings. Nursing leaders must utilize available resources which are technologically sound in teaching through mass health education programme. Nursing leaders should enhance nursing services through reinforcement of teaching. Nursing profession can offer opportunity to create awareness among mothers regarding the early detection of hearing impairment through health education.

6.4 Nursing research

The study helps the investigator to develop insight regarding the early detection of hearing impairment in infants through computer assisted teaching programme. This study will serve as a valuable reference material for future investigators. Interior research studies can be conducted including the entire three domain i.e. knowledge, attitude and practice among mothers can be conducted. Teaching package on prepared by the researcher will be helpful for giving mass health education. Large scale studies can be conducted on large samples to describe early detection of hearing impairment in infant among mother.

7. Conclusion

This research revealed that the infant mothers had good knowledge regarding early detection of hearing impairment in infant after administration of computer assisted teaching program. Hence the infant mothers should be encouraged to attend teaching sessions, health education program, workshop etc. will be more receptive to improve their knowledge level.

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