

Effect of an Educational Program on Mothers' Knowledge, Practice, Empowerment and Satisfaction Regarding Caring of their Children Post Cochlear Implant

* Yasmine Abd EL- Ghany Abd EL-Fatah**; Samah Abdallah Mohamed Amer; ***
Hanan Nabawy Elaasar.

* Lecturer of Pediatric Nursing /Faculty of Nursing / Benha University/Egypt

, * Assistant professor of Pediatric Nursing /Faculty of Nursing / Benha University/Egypt

Abstract

Background: Cochlear implants help children with severe hearing loss receive, process, and interpret sounds. Hearing loss can affect these areas of development. **Aim of the study** was to evaluate the effect of educational program on mothers' empowerment and satisfaction regarding caring of children post cochlear implant. **Research Design:** A quasi- experimental research design was used. **Setting:** This study was conducted in Department of Cochlear Implants and Audiology in Bahteem Health Insurance Hospital at Qalyubia governorate affiliated to the ministry of health and population. **Subjects:** Purposive sample of (80) mothers and their children. The total number of mothers was divided randomly into two identical groups. **Tools of data collection:** Four tools were utilized, **Tool (I):** A Structured Interviewing Questionnaire. **Tool (II):** Pediatric Cochlear implant questionnaire. **Tool (III):** Satisfaction with life scale. **Tool (IV):** Mother' empowerment scale. **Results:** the results of the present study revealed that there were highly significant differences in mothers' knowledge, reported practice and their satisfaction and empowerment after educational program implementation $P < 0.001$. **Conclusion:** The study concluded that, educational guidelines significantly improved mothers' knowledge, practice, empowerment and satisfaction regarding caring of their children with cochlear implant. **Recommendation:** Developing and enhancing educational and awareness program to improve and support mothers' empowerment and satisfaction regarding caring of their children with cochlear implant.

Keywords: Educational program, Mothers, Empowerment, Satisfaction, children, and Cochlear Implant

Introduction

A child who is completely deaf or has severe hearing loss can benefit from a cochlear implant. It is a tiny, high-tech electrical device which lets children hear sound. The external part of the implant is surgically implanted behind the ear and the first part lies beneath the skin. (*National institute on deafness and other communication disorders, 2021*). & (*American cochlear implant alliance, 2023*).

Failure of hearing aids to offer sufficient hearing to assist language and speech development, so cochlear implants should be obtained. A cochlear implant can be given to some children who are younger than 12 months old and have bilateral significant hearing loss. This device adjusts hearing aids and identifies children as candidates for cochlear implants (*Food & Drug Administration, 2021*).

One-year-old child with hearing loss should be prepared for a cochlear implant. Children should be exposed to sounds as early as possible during the crucial stage of language learning. To get the most out of the gadget, children must go through numerous speech and language treatment after implantation. *(Victory, 2022)*.

Children who have cochlear implants have improved communication abilities, including speech production, speech recognition and language usage, as well as psychosocial well-being, as a factor in quality of life. However, numerous factors, such as; the child's demographics (chronological age, any additional disabilities), cochlear implant-related factors (age at implantation, period of using device), the aspect of well-being measured as (communication versus self-esteem), family dynamics, and societal & cultural norms regarding hearing levels and cochlear implantation among others, may affect a mother's acceptance of quality of life regarding their child's. *(Warner-Czyz et al., 2018)*.

Having more empowerment gives mothers the chance to learn things that will assist them provide better care for their children. Moreover, empowerment-based educational initiatives help mothers improve their self-management abilities as well as their knowledge, compassion, and self-efficacy. *(Fathalla, 2018)*.

Empowering mothers is the best method to help them support language development and communication skills for their cochlear implanted children. By education, training, and awareness, mothers' empowerment helps in making decisions that affect their lives in response to various social issues. In

addition, mother empowerment refers to capacity to make appropriate life decisions that had previously been denied to them. *(Nicastri, et al,2020)*.

Mothers' satisfaction is a key point to efficiency and quality of nursing care. Moreover, the level of satisfaction to care has long term and immediate benefits in the health of the mother and their children. Mothers' satisfaction is a result of mother's distribution of care for child with cochlear implant as management and rehabilitation therapy program *(Mostafavi, et al., 2017)*.

Mothers' satisfaction highly supported by sufficient knowledge regarding cochlear implant, and how mother offer care to their children *(Sundaresan& Martina, 2018)*. Moreover, mothers' perception of child's quality of life with cochlear implants was positive because their child had acquired the necessary life skills. *(Molla, et al., 2019)*.

The mother is essential to the child's recovery. Mother spends most of the child's time at home and is usually their initial point of contact. Mothers, however, are crucial in how their children are treated. The mother's participation in the treatment of the condition is thought to be essential for ensuring that cochlear implant recipients follow up on their progress and develop the desired language and speech abilities. *(Moradi, et al., 2022)*.

In the healthcare team for cochlear implants, nurses are important. giving mothers the necessary training and experience to care for their children. After cochlear implantation, regular continuation of the mother's scheduled follow-up is required for successful results. Moreover, counsel mothers to make sure that their children's devices are set up properly and to have their children checked out more frequently than twice a year if there are any concerns about how their listening skills are growing. (Krogmann, 2022).

Significance of the study:

According to statistics from the World Health Organization, 1,500 Egyptian children receive cochlear implants each year, and more than 7,000 Egyptian children require cochlear implant surgery each year, according to the Egypt Cochlea 2018 conference. According to El Shazly, the conference's president, early detection, diagnosis, and best treatment of hearing loss are crucial for children's academic and language development. Identification and treatment of hearing loss may be delayed by mothers' ignorance and lack of experience. Little is known about the understanding and practice of family (Samir, 2018).

For early hearing detection and intervention (EHDI) of substantial enduring permanent hearing impairment (PHI), universal newborn hearing screening (UNHS) in the first month of life is essential. It was started in January 2007 and was first introduced in 2003 by a Regional Council Resolution. Implement the program between 2013 and 2019 to aid in the early detection of

pediatric hearing loss (Malesci, et al., 2021).

Mothers' awareness of how to care for their children with cochlear implants advance communication, academic achievement and social skills in children with cochlear implants as well as their knowledge of the expectations and obstacles that these children face (Salah, et al., 2022). The goal of the current study is to increase mothers' empowerment and satisfaction with regard to raising children who have cochlear implants.

Aim of the study

This study aimed to evaluate the effect of an educational program on mothers' knowledge, practice, empowerment and satisfaction regarding caring of their children post cochlear implant through:

- Assessing mothers' knowledge, practice, empowerment and satisfaction regarding caring of their children post cochlear implant.
- Designing and applying an educational program about caring of children post cochlear implant.
- Evaluating the effect of an educational program on mothers' knowledge, practice, empowerment and satisfaction regarding caring of their children post cochlear implant.

Research Hypotheses:

The following research hypotheses would be formulated to achieve the aim of this study:

H1: After the implementation of the educational program, mothers' reported practice in the study group would be much higher than in the control group.

H2: After the implementation of the educational program, mothers' empowerment in the study group would be much higher than in the control group.

H3: After the implementation of the educational program, the study group's mothers' satisfaction would be much higher than that of the control group.

Subjects and method

Research Design:

A quasi-experimental research design was utilized to conduct this study.

Research Settings:

The study was carried out at department of cochlear implants and audiology in Bahtem health insurance hospital at Qalyubia governorate affiliated to Ministry of Health and population.

Subject:

The study subject was consisted of purposive sample of (80) mothers and their children. The total number of mothers was randomly split into two groups that were both identical (control group (40) & study group (40). Mothers in the study group received an educational program in addition to routine department care to their children such as; vital signs and feeding, whereas mothers in the control group simply received routine department care only. The children were involved in the study according to inclusion criteria.

Inclusion criteria:

- The age of children is between 1<5 years.
- Children from both sexes.
- Children with hearing impairment.

Tools of the study:

There were four tools used to collect the required data. Those tools as the following:

Tool I: -A structured interviewing questionnaire: It was developed by the researchers based on scientific literature, it was adopted from *Ali , et al, (2019)* It was composed in English and then translated into basic an Arabic language to meet the sample needs. It had five parts:

Part (1): Personal characteristics of the studied mothers such as; age, educational level, occupation, residence, and the number of children.

Part (2): Personal characteristics of the studied children such as; age, sex and hearing history.

Part (3): History of children hearing impairment: It consisted of (8) questions such as: age of start wearing hearing aids, duration, wearing hearing aid in the opposite ear, time required to get used to the new device's sound, importance of wearing hearing devices full time, impacts of cochlear implant on child and family life and importance of cochlear implant to child.

Part (4): Mothers' knowledge regarding cochlear implant: it included (4) open ended questions such as; definition, functions, causes and complications of cochlear implant.

Scoring system of the knowledge questionnaire:

After completing the interview questionnaire, mothers' knowledge was assessed by comparing it to a model key answer accordingly, the complete correct answer was received (2) scores, (1) for incomplete correct answer and (0) for do not know answers. Their overall level of knowledge was rated as either good (> 60%), average (from 50 to less than 60%)

and poor (<50%) based on the mother's responses.

Part (5): Mothers' reported practice regarding cochlear implant: The researchers developed it after reading related literature, it was adopted from *Ali , et al, (2019)* to assess mother's practices concerning care of their children after having cochlear implants operation. It included three main practices checklists: daily practices (6) steps, monthly practices (2) steps and as needed practices (3) steps with total steps (11).

Scoring system of mothers' reported practice: According to the actual mothers reported practices, every step was assigned to two levels, by which done was given (1) and not done was given (0). Their total level of reported practice was divided as satisfactory level ($\geq 60\%$) and unsatisfactory level ($< 60\%$).

Tool II: Pediatric Cochlear implant questionnaire: this questionnaire was adopted from *Archbold, et al, (2002)*, to evaluate mothers' understanding of cochlear implants. It had three subitems: supporting the child (7) items, decision to implant (15) items and impacts of implantation (9) items with total of (31) items.

Scoring System of Cochlear Implant Questionnaire

The scoring contributions for each item ranged from 1 to 5. Overall results from the cochlear implant questionnaire ranged from 31 to 155 distributed as the following: strongly disagree ($< 50\%$), neutral (50 - < 75) and strongly agree ($> 75\%$).

Tool III: Satisfaction with life scale

The scale was adopted from *Diener, et al, (1985)*. It is a 5-item scale with a response format based on a Likert scale with 7 points. Participants graded each of the five statements on how

much they agreed or disagreed with it. It was made up of a raw score (between 5 to 35). Higher scores correspond to higher life satisfaction.

Scoring System of Satisfaction with life scale:

Scores can be assigned into three well-being categories and interpretative text in provided for each as the following, (5 – 9) Extremely dissatisfied, (10-24) to some extent and Extremal satisfied (25 - 35).

Tool IV: Mother' empowerment scale:

the scale was adopted from *Koren, et al, (1992)*. It was developed to measure mother' empowerment in relation to their cochlear-implanted children. It composed of (34) items.

Scoring System of Mother' empowerment scale:

The mothers rated each item on a 5-point Likert-type rating scale, by which score (1) was given for (not true at all), score (2) was given for mostly not True, score (3) was given for Somewhat True, score (4) was given for mostly true, and score (5) was given for very true. According to the mother's responses, the scale's overall scores were distributed as the following: strongly disagree (0 - < 20), to some extent (20- < 40) and strongly agree (40 - ≤ 60).

Tools validity and reliability:

The study tools' content validity was tested by a jury of three pediatric nursing specialists (professors at Benha University), to ensure both face and content validity. The tools were examined by the experts for clarity, applicability, relevance, completeness, and simplicity. The jury comments were considered regarding the format, layout, paraphrasing, consistency, accuracy, and relevancy of the tools. Then data was gathered using the final form.

Reliability

Using the Cronbach's alpha coefficient test, the tools' internal consistency was evaluated in order to determine their reliability. According to the knowledge assessment questionnaire, this was ($r=0.83$). An observational checklist's reliability score was ($r=0.87$), while mothers' opinions on a Likert scale was ($r=0.82$).

Ethical considerations:

A concise explanation of the study's objectives and anticipated results was given to mothers of children to ensure that participation was voluntary. Oral consent was obtained from all mothers of the studied children and informed that they were free to leave the study at any moment without providing a reason. The mothers received assurances that all information gathered would be handled in confidence, kept anonymous and used only for research. Formal permission for data collection was obtained from the Dean of Faculty Nursing including the title, aims and outcomes of the study were illustrated as well as the main data items to be covered, and the study was conducted after having the required permission.

Pilot study:

Pilot study was conducted on 10% of the total sample size (8 mothers and their children) over a period of two weeks from the beginning to the middle of January 2022 to test the applicability and validity of the study tools and to determine how long it would take to complete the questionnaire. The pilot sample included in the study subjects because there were no significant modifications were carried out on the study tools.

Field work:**a) Assessment Phase**

An approval from Faculty Dean of Nursing, Benha University was obtained in order to carry out the study. Three months, from the beginning of February 2022 to the end of April 2022, were dedicated to the actual fieldwork. as soon as the faculty ethics committee has given its consent. The study's overall sample size was 80 participants, and then were divided to 40 as a study group and 40 as control group. The study group divided into (2 groups), each group composed of (20 mothers). The objective of the study was explained by the researchers to all mothers included in the study. The researchers interviewed each mother. At the start of the session, all the mothers were made aware that they might leave at any time during the discussion if they became emotionally upset. The interview lasted between 15 and 30 minutes with each mother to fill out knowledge, practice, empowerment and satisfaction about cochlear implants by rotation once week from 9-12 pm. Each week the researchers took about (6-7) mothers.

b) Program construction:

Researchers created an instructional program based on actual mothers needs to know about caring for their children after cochlear implants. To increase the mothers' knowledge, reported practice, and satisfaction about post-cochlear implant care for their children, the program was created, edited and modified from the relevant literature.

c) General objectives:

The aim of the educational program was to improve the mothers' knowledge, practices, satisfaction and empowerment regarding post cochlear implant care for their children.

d) Specific objectives:

-By the end of this program, each mother should be able to:

- Identify cochlear implant.
- List indications of cochlear implant.
- Discuss functions of cochlear implant.
- Enumerate complications of cochlear implant.
- Discuss necessary nursing care after cochlear implant.

e) Program implementation:

The program was conducted at the study setting through six sessions (two sessions for theory and four sessions for practice). The program was run according to a timetable designed for mothers, which contained the date, location, topic, time and length of each session. The theoretical part covered (definition of cochlear implant, function, causes, and complications) and the practical parts included the mothers' practice regarding care of cochlear implant. Prior to training sessions, mothers' knowledge and reported practice were first individually assessed using the proposed tools. The training began by teaching the theoretical part about care necessary for children after cochlear implant. The researchers conducted the sessions with the mothers in the study group once per week for 4 weeks. The theoretical pediatric course consists of definition, indications, procedure. Each session lasted between 30 and 45 minutes, during which the mothers may offer interventions based on their extensive knowledge and experience with cochlear implants. The health education included illustrated Arabic booklet contains guidelines for enhancing mothers' knowledge and practice with cochlear implants as well as a posttest administered four weeks after the health education was

implemented. The theoretical component of the educational guideline was presented in two sessions in the form of lectures/discussions, while the practical component took place over the course of four sessions in the form of demonstration and redemonstration using role play, simulator, real objects, discussions, and brainstorming. The researchers utilized effective media of conveying information as, power point presentations and posters. A guideline handout was developed and given to mothers as a reference to be utilized after guideline implementation.

f) Evaluation phase:

During this period the researchers assessed mothers' knowledge and attitude and observed the mothers' reported practice regarding care provided after cochlear implant through mothers' self-administered questionnaire sheet.

Statistical design:

The collected data were arranged, tabulated, and examined using electronic computer and statistical package for social sciences (SPSS) version 20. Descriptive statistics were calculated for the data in the form of mean and standard deviation for quantitative data, and frequency and distribution for qualitative data. Also in analytical statistics, inter-group comparison of categorical data was performed by using chi square test (X^2 value). Also, Pearson correlation coefficient test was used. P value <0.05 was considered statistically significant (*) while >0.05 statistically insignificant and P value <0.001 was considered highly significant (**) in all analyses.

Results

Table (1): Indicated that, more than one third (35.0 %) of the control group are ranged between 25-30 years old. Regarding to mothers' level of education it is founded that, less than half (45.0 %) of the control group are having secondary schools. More than half (55.0%) of the study group were workers. While less than two thirds (60.0%) of mothers in the study group living in urban area, in relation to number of living children, it is found that, less than half of mothers (40.0%) of the control group had two children. This table also showed that, the majority (90.0% & 95.0%) of the study and control groups had no other children with hearing loss.

Table (2): Illustrated that, half (50.0 %) of children in the study group started wearing hearing aids at the age of six months. It also clarified that, nearly two thirds (60.0%) of the study group informed that hearing aids seemed to be sometimes helpful for the child. While, more than three quarters (75.0&80.0%) of the study and control groups said that hearing aids were important for hearing soft sounds. While, the majority (85.0%) of the study group informed that hearing aids seems to be helpful in understanding speech.

Table (3): Clarified that, half (50.0 %) of children in the study group had cochlear implant at the age of four to five years. It also clarified that, more than three quarters (75.0&85.0%) of the study and control groups informed that their children had cochlear implant from less than six months. While, nearly two thirds (65.0%) of the study group informed that, cochlear implant seems to be significantly helpful for the child.

Table (4): Demonstrated that, less than two thirds (60.0 %) of mothers in the study group assured that there were various impacts of cochlear implant on child and family life such as; treatment cost, transport problems, problems with care of other children. It also clarified that, the majority (85.0%) of the study group informed that hearing loss leads to language disorders. While, three quarters (75.0 %) of the control groups said that hearing loss leads to poor academic achievement. This table also clarified that, less than half (45.0%) informed that hearing loss leads to different types of the psychological problems such as; social withdrawal, irritability, anger, lack of focus and negativism.

Table (5): Illustrated that, there was a highly statistically significant difference ($p < 0.001$) in study group at post / educational program according to their knowledge regarding cochlear implant.

Fig. (1): Showed that, there was a highly statistically significant difference ($p < 0.001$) in study group pre/ post an educational guideline according to their total level of knowledge regarding cochlear implant.

Fig. (2): Clarified that, there was a highly statistically significant difference ($p < 0.001$) in study group pre/ post an educational program according to their total level of practice regarding cochlear implant.

Fig. (3): Illustrated that, there was a highly statistically significant difference ($p < 0.001$) in study group pre/ post an educational program according to their total level of satisfaction with life of their children after had cochlear implant.

Fig. (4): Clarified that, there was a highly statistically significant difference ($p < 0.001$) in study group pre/ post an

educational program according to their opinion regarding family empowerment scale.

Table (6): Demonstrated that, there is a positive correlation between total mothers' knowledge and total practical score regarding post cochlear implant care in pre / post education program in both groups ($P < 0.001$).

Table (7): Showed that, there was a positive correlation between total mothers' empowerment and total satisfaction score regarding post cochlear implant life in pre / post education program in in both groups ($P < 0.001$).

Table (1): Percentage distribution of the studied mothers according to their personnel characteristics (n=80)

Items	Study group n=40		Control group n=40		X ²	P value
	N	%	N	%		
Age (years)						
- > 20	10	25.0	12	30.0	2.220	0.0695
- 20 > 25	10	25.0	8	20.0		
- 25 > 30	8	20.0	14	35.0		
- 30 > 35	6	15.0	4	10.0		
- 35 > 45	6	15.0	2	5.0		
- < 45	0	0.0	0	0.0		
Mean ±SD	26.35±5.878		25.070±5.0936			
Level of education						
Primary school	16	40.0	16	40.0	1.600	0.758
Secondary school	12	30.0	18	45.0		
University education	12	30.0	6	15.0		
Occupation						
- Worker	22	55.0	26	65.0	0.417	0.519
- House wife	18	45.0	14	35.0		
Residence						
- Urban	24	60.0	20	50.0	0.404	0.525
- Rural	16	40.0	20	50.0		
Number of living children						
- 1	8	20.0	6	15.0	1.186	0.880
- 2	14	35.0	16	40.0		
- 3	8	20.0	6	15.0		
- 4	10	25.0	12	30.0		
- Other children with hearing loss						
- Yes	4	10.0	2	5.0	0.533	0.465
- No	36	90.0	38	95.0		
Consanguineous marriage						
- Yes	28	70.0	22	55.0	2.558	0.110
- No	12	30.0	18	45.0		

* No statistical significance P value >0.05

Table (2): Percentage distribution of the studied children according to their hearing history (n=80)

Items	Study group n=40		Control group n=40		X ²	P value
	N	%	N	%		
Age of start wearing hearing aids						
- Birth.	8	20.0	14	35.0	4.758	0.984
- 6 months.	20	50.0	14	35.0		
- After 6 months.	12	30.0	12	30.0		
Duration of wearing hearing aids						
- More than 3 months.	18	45.0	20	50.0	0.100	0.752
- Less than 3 months.	22	55.0	20	50.0		
Wearing hearing aids during all waking hours						
- Reject.	4	10.0	14	35.5	5.051	0.482
- Wear them some of the time.	16	40.0	6	15.0		
- Wear them full time.	20	50.0	20	50.0		
Hearing aids seems to be helpful for child						
- Not really.	2	5.0	6	15.0	6.664	0.497
- Can't tell.	4	10.0	14	35.0		
- Sometimes.	24	60.0	10	25.0		
- A lot, but not enough.	10	25.0	10	25.0		
Importance of wearing hearing aids during all waking hour						
- Very important.	12	30.0	16	40.0	0.914	0.633
- Somewhat important.	24	60.0	18	45.5		
- Not that important.	4	10.0	6	15.0		
Importance of wearing hearing aids for hearing soft sounds (whispers)						
-Yes	30	75.0	32	80.0	1.143	0.705
- No	10	25.0	8	20.0		
Child learning is best by overhearing or by watching others						
- Overhearing.	26	65.5	22	55.0	1.714	0.519
- Watching others.	14	35.0	18	45.0		
Hearing aids seems to clarify speech						
- Yes	34	85.0	30	75.5	5.714	0.547
- No	6	15.0	10	25.0		

* No statistical significance P value >0.05

Table (3): Percentage distribution of the studied children according to their history regarding cochlear implant (n=80)

Items	Study group n=40		Control group n=40		X ²	P value
	N	%	N	%		
Age of receiving the cochlear implant/years						
1 - < 2	8	20.0	14	35.0	2.439	0.478
2 - < 3	2	5.0	0	0.0		
3 - < 4	10	25.0	12	30.0		
4 - < 5	20	50.0	14	35.0		
Duration of having the cochlear implant						
- More than 6 months	10	25.0	6	15.0	2.511	0.467
- Less than 6 months	30	75.0	34	85.0		
Wearing a hearing aid in the opposite ear						
-Yes.	22	55.5	20	50.0	0.102	0.752
-No.	18	45.5	20	50.0		
Time necessary to adjust with the sound of the new device						
-Immediately.	12	30.0	16	40.0	1.745	0.984
- Approximately a month.	16	40.0	4	10.0		
- 6 months later.	12	30.0	20	50.0		
Cochlear implant seems to be helpful for child						
- Uncertain.	0	0.0	6	15.0	3.931	0.183
- Some, but not enough.	14	35.0	14	35.0		
- Significantly.	26	65.0	20	50.0		
Importance of wearing hearing devices full time						
-Very important	34	85.0	32	80.0	1.173	0.677
- Somewhat important.	6	15.5	8	20.0		
- Not that important	0	0.0	0	0.0		

No statistical significance P value >0.05

Table (4): Percentage distribution of the studied mothers according to their opinion about impacts of hearing loss (n=80)

Items	Study group n=40		Control group n=40		X ²	P value
	N	%	N	%		
Impacts of cochlear implant on child and family life						
- Treatment cost.	2	5.0	6	15.0	4.848	0.303
-Transport problems.	10	25.0	4	10.0		
-Problems with care of other children).	2	5.0	4	10.0		
- Specific impacts on family life.	2	5.0	8	20.0		
- All the above.	24	60.0	18	45.0		
Language disorders from hearing loss						
-Yes.	34	85.0	26	65.0	1.425	0.429
-No.	6	15.0	14	35.0		
Hearing loss leads to poor academic achievement						
-Yes.	28	70.0	30	75.0	0.125	0.723
-No.	12	30.0	10	25.0		
Psychological problems from hearing loss						
-Yes.	22	55.0	30	75.0	1.758	0.185
-No.	18	45.0	10	25.0		
Types of the psychological problems from hearing loss						
- Social withdrawal.	2	5.0	0	0.0	5.364	0.373
- Irritability.	4	10.0	8	20.0		
- Anger.	4	10.0	4	10.0		
- Lack of focus.	6	15.0	0	0.0		
- Negativism.	6	15.0	8	20.0		
- All of the above.	18	45.0	20	50.0		

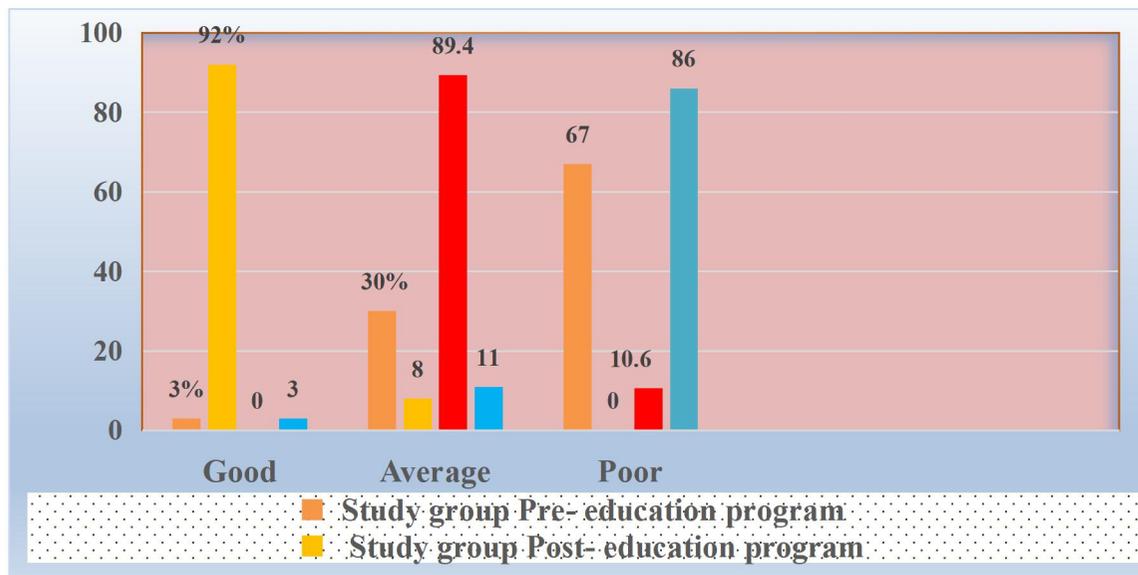
* No statistical significance P value >0.05

Table (5): Percentage distribution of the studied mothers according to their knowledge regarding cochlear implant (n=80)

Items	Study group (n=40)						X ²	P value	Control group (n=40)						X ²	P value
	Pre educational program			Post educational program					Pre educational program			Post educational program				
	Complete correct answer	Incomplete correct answer	Don't know	Complete correct answer	Incomplete correct answer	Don't know			Complete correct answer	Incomplete correct answer	Don't know	Complete correct answer	Incomplete correct answer	Don't know		
	%	%	%	%	%	%			%	%	%	%	%	%		
Definition of cochlear implant.	5.0	35.0	60.0	80.0	20.0	0.0	26.053	0.000*	0.0	40.0	60.0	0.0	30.0	70.0	1.354	0.378
Functions of cochlear implant.	4.0	66.0	30.0	90.0	10.0	0.0	24.000	0.000*	5.0	66.0	29.0	5.0	40.0	55.0	1.365	0.254
Causes of cochlear implant.	5.0	50.0	45.0	85.0	15.0	0.0	24.807	0.000*	8.0	50.0	42.0	10.0	30.0	60.0	1.541	0.984
Rare complications of cochlear implant.	0.0	30.0	70.0	75.5	25.0	0.0	20.267	0.000*	0.0	27.0	73.0	0.0	20.0	80.0	1.487	0.982
Care provided after cochlear implant.	0.0	20.0	80.0	85.0	15.0	0.0	31.600	0.000*	0.0	20.0	80.0	0.0	67.0	33.0	1.547	0.367

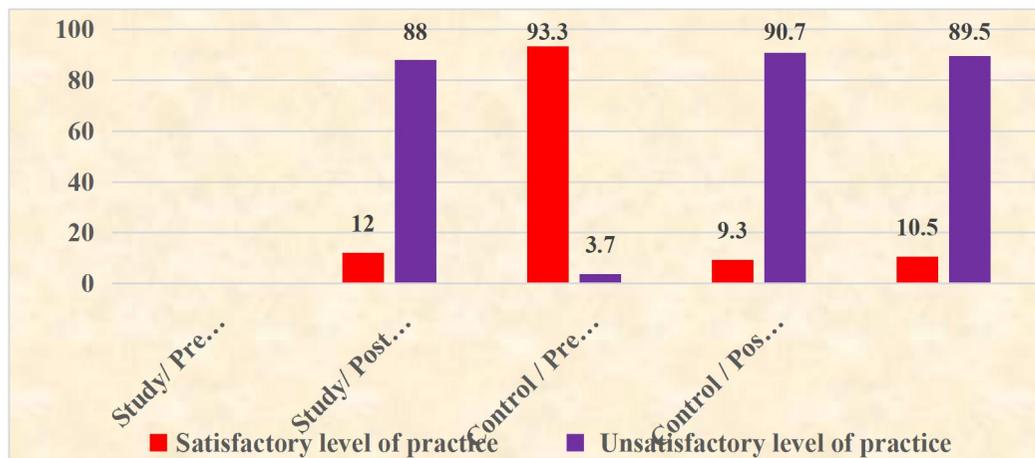
Highly statistically significant at P value <0.001**

Figure (1): Percentage distribution of the studied mothers in both groups according to their total level of knowledge regarding cochlear implant (n=80)



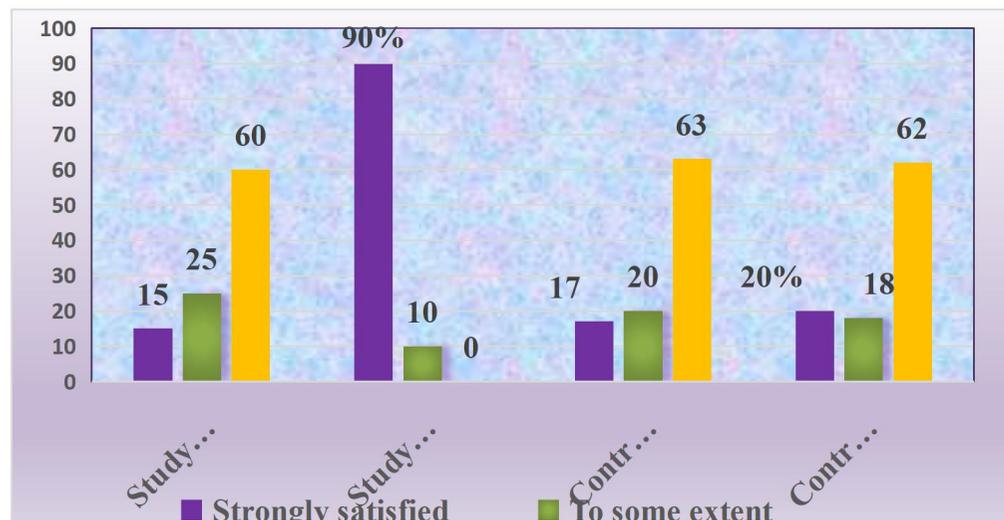
Highly statistically significant at P value <0.001**

Figure (2): Percentage distribution of the studied mothers in both groups according to their total level of reported practice regarding care of their children after having cochlear implant (n=80)



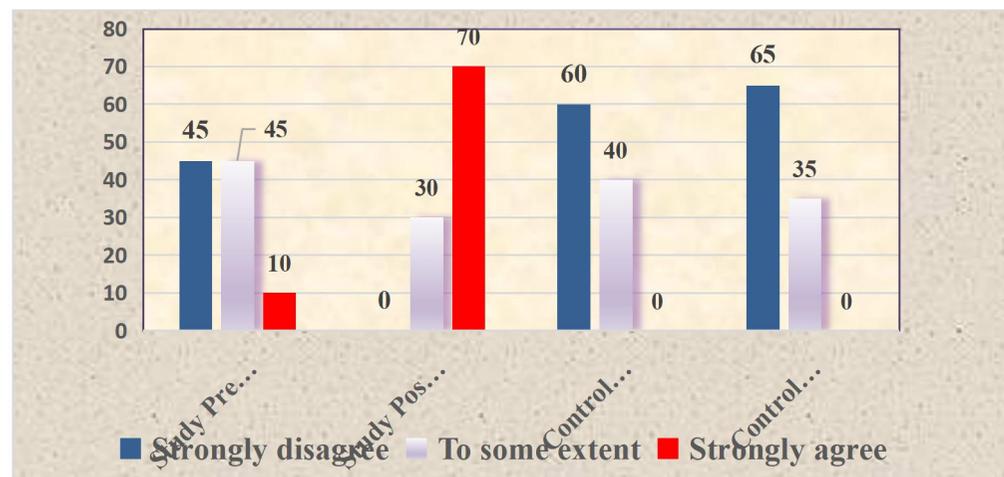
Highly statistically significant at P value <0.001*

Figure (3): Percentage distribution of the studied mothers in both groups according to their total level of satisfaction with life of their children after having cochlear implant (n=80)



Highly statistically significant at P value <0.001**

Figure (4): Percentage distribution of the studied mothers in both groups according to their opinion regarding family empowerment scale (n=80)



Highly statistically significant at P value <0.001**

Table (6):- Correlation coefficient between total knowledge score and total practice score of mothers in both groups through educational program (n=80)

Variable	Total practice							
	Study group n=(40)				Control group n=(40)			
	Pre educational program		Post educational program		Pre educational program		Post educational program	
	r	P	R	P	R	P	r	P
Total knowledge score	0.446	0.000*	0.536	0.000*	0.563	0.312	0.511	0.314

Table (7):- Correlation coefficient between total empowerment score and total satisfaction score of mothers in both groups through educational program (n=80)

Variable	Total empowerment							
	Study group n=(40)				Control group n=(40)			
	Pre educational program		Post educational program		Pre educational program		Post educational program	
	r	P	R	P	R	P	r	P
Total satisfaction score	0.324	0.000*	0.426	0.000*	0.453	0.231	0.471	0.342

Discussion

The best treatment option for children with severe to profound sensor neuronal hearing loss is now cochlear implants coupled with the device's enhanced technical ability to provide hearing sensitivity within speech, there have been improvements in patient eligibility and a gradual lowering of the minimum age requirement for implantation over time (*Vincenti et al., 2020*).

A child is born with a hearing impairment, both parents feel increased levels of stress, but mothers are thought to be more susceptible due to the heavy burden of responsibilities connected with attending appointments, maintaining hearing aids and providing at-home care. Mothers are said to acquire different coping techniques than fathers as a result. Parental empowerment refers to parents feeling more in charge of and knowledgeable about their child's language development, communicative limitations and needs related to hearing loss (*Erbasi et al., 2016*).

Regarding personnel characteristics of the studied mothers in control group, the current study showed that, more than one third ranged between 25-30 with the mean age was 25.070 ± 5.0936 . This may be due to age of mothers was important factor in providing knowledge and understanding new experience with care. These results agreed with the findings of the study done by *Zaidman-Zait et al., (2017)* entitled "Mothers' and fathers' involvement in intervention programs for deaf and hard of hearing children. Disability and Rehabilitation", who reported that, caregivers' age is between 25

to 35 years old, with Mean \pm SD= 30.77 ± 4.99 . This fact is reflecting that mothers are considered the main caregivers to children with hearing impairment.

Concerning level of education of the studied mothers, the current study revealed that, less than half of the control group were having secondary schools and more than half of the study group were workers. These results were disagreed with the findings of the study done by *Yiğit et al., (2018)*, entitled "Satisfaction with Life among Mothers of Pediatric Cochlear Implant Candidates: The Impact of Implant Operation and Sociodemographic Factors". Who reported that most of mothers were primary school graduates and unemployed.

As regarding residence of the mothers in present study, it was observed that less than two thirds in the study group living in rural areas. These results conflicted with those of the *Namra et al., (2022)* entitled "Effects of Cochlear Implants on the Quality of Life of Children". Who stated that fewer than half of mothers lived in rural areas.

The current study found that, the majority of the mothers in study and control groups were having no other children with hearing loss. These results were in line with those of a study by *Yiğit et al., (2018)*, who indicated that, mothers were having another child with hearing loss were present.

According to studied children gender, the current study showed that, three quarters of children in the control group were males. And less than half of children in the study group were females. These findings were disagreement study

done by *Mostafavi, et al., (2017)* entitled "Family-Based Training Program: The Role of Mothers' Empowerment in the Speech Development of Children with Hearing Impairments" who reported that more than half of the children in the intervention group were females and less than half of the children in the control group were males.

In relation to the studied children hearing history, the present study illustrated that half of children in the study group start wearing hearing aids at the age of six months and more than three quarters of the study control groups said that hearing aids are important for hearing soft sounds. This result was consistent with *Marnane & Ching, (2020)* who conducted study entitled "Hearing aid and cochlear implant use in children with hearing loss at three years of age: Predictors of use and predictors of changes in use" and stated that wearing hearing aids at the age of six months and three quarters of children were consistent users of hearing devices, and reported usage was higher for children who used cochlear implants than those who used hearing aids. Device use was significantly associated with functional performance in real life and important for hearing soft sounds.

Concerning studied mother's opinion about impacts of hearing. The current study showed that, two thirds of mothers in the study group, cochlear implants have a variety of negative effects on children and families, including high costs for treatment, transportation issues, and issues taking care of other children's. The limited availability of specialized services, particularly in remote or rural communities. These findings were

consistent with *Zaidman-Zait et al., (2019)* who conducted study entitled "Cochlear Implantation among Deaf Children with Additional Disabilities: Parental Perceptions of Benefits, Challenges, and Service Provision" who reported that the limited availability of specialized services, especially in remote or rural communities. "It would have been great to have more services for him, for speech and language or whatever else is necessary. Whereas their was insufficient provision of speech and language therapy services for their implanted children.

In the same context the majority of the study group informed that hearing loss leads to language disorders. While three quarters of the control groups said that hearing loss leads to poor academic achievement. And less than half informed that hearing loss leads to different types of the psychological problems such as; social withdrawal, irritability, anger, lack of focus and negativism. These findings were supported by the results of the study done *Mourad et al., (2019)* entitled "Physical and psychosocial Impact of Cochlear Implantation on children" who stated that their communication problems lead to emotional and social disadvantages. Children with untreated hearing loss complained of feeling lonely and depressed at school and were unable to interact and converse with their peers, which had a negative effect on the child's vocational choices.

According to *Salah et al. (2022)* reported that parental experiences of academic achievement were significantly lower than the score of academic achievement expectations in the same context, and these results indicated that parents had high expectations for academic

achievement in relation to children who were cochlear implant recipients.

On assessing the studied mother's knowledge regarding cochlear implant. The findings of the current study reflected that, the majority of mothers in the study group had completely correct answer about functions of cochlear implant, causes, care provided after cochlear implant post educational program compared with preprogram. From researchers' points of view, this could be due to educational program set in place of audiology unit so; the desire to enhance or at least refresh their knowledge to increased awareness of the cochlear implant and its importance among the children's is needed. These findings were supported by the results of the *Erbasi et al., (2016)* who stated that parents, particularly mothers, felt responsible for their child's outcomes and assumed various duties, functions of cochlear implant, care provided after cochlear implant post educational program compared with pre/program.

The current study found that the nearly all mothers of study group had good level of knowledge regarding cochlear implant post educational program compared with preprogram. Moreover, there was a highly statistically significant difference ($p < 0.001$) in study group. This result can be explained by the fact that the parents were very interested with their children, and they always help them to adapt with their life. These findings were supported by the results of the study done by *Ali et al., (2019)* entitled "Family caregiver's adjustment for their children with hearing impairment" which found that the majority of families had good and acceptable score levels of knowledge after

completing an educational program, corroborated these conclusions.

Similarly, the current study found that the majority of the control group had poor & average level of knowledge regarding cochlear implant in pre and post educational program. The findings of a study conducted by *Runnion, (2017)* that found that, the most of mothers had trouble comprehending and paying attention of knowledge regarding cochlear implant in pre and post educational program confirmed these conclusions.

According to studied mothers who had cochlear implants reported taking care of their children. The current study found that the majority of the mothers in study group did not examine microphone, processor and transmitter or headpiece for damage, dirt and/or moisture and protection from infection in pre /educational guideline. While all of them stored cochlear implant in a desiccation system to remove moisture, including humidity and sweat and replace batteries in processor when needed post educational program. These results were in line with *Greenberg, (2019)* findings, which indicated that mothers participated in an intervention program that supported and shared childrearing tasks such as taking care of their child and promoting their child's outcomes following the cochlear implant in a desiccation system to remove moisture, including humidity.

The results of the current study showed that, despite participating in a pre-educational program for cochlear implants, the majority of mothers in the study group did not perform child care at a suitable

level. In the meantime, almost all of the mothers in the study group had satisfactory levels of post-educational practice. Also, there was a study group difference that was extremely statistically significant ($p < 0.001$). Also, it was made clear that the majority of mothers in the control group had poor levels of child care experience following the pre and post educational program for cochlear implants. According to experts, the improvement was a highly statistically significant difference that was related to the study group's greater familiarity and comprehension with the program material. Hence, enough instruction and knowledge are required to create suitable

Concerning studied mother's satisfaction with life of their children after receiving cochlear implant. The current study demonstrated that; half of the study group were slightly dissatisfied with life pre - educational program. While less than two thirds of them were extremely satisfied with the item. Also, there was a highly statistically significant difference ($p < 0.001$) in study group, post program implementation. These results were in line with those of *Kumar et al., (2017)*, who reported that mothers of children with profound sensor neural hearing loss who had cochlear implants revealed that significantly improved maternal life satisfaction after cochlear implant surgery in the study group post educational program their expectations are realistic regarding their child's condition as compared pre an educational program where there was lower maternal life satisfaction.

As regards to the studied mother's opinion regarding family empowerment. Less than half of the study group were

found to be extremely opposed to the family empowerment scale pre-educational program. Less than three quarters of study group, on the other hand strongly agreed with family empowerment scale post educational program. Also, there was a study group difference that was extremely statistically significant ($p < 0.001$). Also, it was made clear that, following the teaching session; less than two thirds of mothers in control group were strongly disagreed with family empowerment scale post educational program. From researchers' points of view opportunities to pick up new abilities and feel empowered, according to studies, can help people resolve their worries, find answers to their difficulties, and achieve their goals.

In the same context these present study findings were in agreement with *Madell, (2019)* who stated that, several clinical investigations have demonstrated the effectiveness of empowerment practices that can support the families of hearing-impaired children. Three quarters of study group strongly agreed with family empowerment scale post educational program. How the parents' sense of efficacy in treating and managing their child's hearing impairment may benefit the child's language development.

According to *Mostafavi, et al., (2017)* who demonstrated the considerable effectiveness of family-based training for mothers of children with significant hearing loss was significantly effective in the mothers' empowerment and its components (efficacy and adaptation). Additionally, over the course of a year, favorable changes in children's conduct were independently predicted by perceived loyalty to family-centered care systems and

familial empowerment. The family-centered care systems and improvements in children's behavior were mediated by family empowerment. At the same time, results of children's speech development showed a higher improvement in the intervention group compared to the control group.

In the study group, the present findings showed a positive association ($P < 0.001$) between the total mothers' knowledge and the overall practice score for post-cochlear implant care. This discovery supported the research premise. According to research findings that suggested the offered program was successful. This outcome may be explained by the fact that mothers' practice scores significantly raised following the intervention program, which suggests that education may influence knowledge. Education could aid mothers' in improving their knowledge to increase their abilities, family empowerment, and contentment with the lives of their children in the audiology unit. These results corroborated those of *Glanemann et al. (2019)*, who demonstrated a beneficial effect of the program on parental awareness of children's language development.

Conclusion:

Based on the results of the present study, there was highly statistically significant difference in the studied mothers' knowledge, reported practice, empowerment, and satisfaction regarding care of their children with cochlear implant after educational program implementation.

Recommendations:

- Educational programs for mothers of children with cochlear implants might benefit from educational initiatives that raise awareness of hearing loss, its causes, and available preventative and therapeutic measures.
- Informational program on how to care for their children, the value of rehabilitation, and follow-up for mothers of children with cochlear implants
- Neonatal hearing screening for early detection and intervention, treatment of long-term hearing loss.
- Further studies must be done to improve and support mothers' empowerment and satisfaction regarding caring of their children with cochlear implant.
- Reapplication of the present study in different setting for generalization.

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