

Impact of Instructional Guidelines on Knowledge and Practices of Mothers Having Children with Cochlear Implantation

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Abstract

Background: Pediatric cochlear implantation significantly improves various quality of life aspects for hearing-impaired children by influencing communication. **Aim:** determine the impact of instructional guidelines on knowledge and practices of mothers having children with cochlear implantation. **Design:** A quasi-experimental research design. **Sample:** A convenient sample of a total 200 of mothers and 200 children after cochlear implantation, divided equally into two groups (control & study group). **Setting:** Ear, Nose, and Throat outpatient clinics at Sohag University Hospital. **Tools:** **Tool I:** Structured interview questionnaire sheet: it is composed of two parts; mothers' personal data, and children's personal data, **Tool II:** Mothers' knowledge about cochlear implantation (pre/post); **Tool III:** Mothers' self-reported practice for their children with cochlear implantation (pre/post). **Results:** The majority of the mothers in the study group had a satisfactory level of knowledge and adequate level of practice toward caring for their children who have cochlear implantation post-instructional guidelines. There was a highly statistically significant difference between mothers in the study and control group regarding knowledge and self-reported practice after instructional guidelines implementation. **Conclusion:** The instructional guidelines improved knowledge and reported practice of mothers having children with cochlear implantation. **Recommendation:** Instructional guidelines for mothers about caring for their children after cochlear implantation are highly recommended.

Keywords: Children, Cochlear implementation, Instructional guidelines, Knowledge and practices, mothers.

Introduction

A medical condition known as severe and profound childhood hearing loss has an impact on how the brain develops and how well a person lives. Untreated hearing loss in children can have effects beyond the development of spoken language. Communication, social interaction, self-image, cognition, and academic achievement can all be impacted, which could hurt a person's life. Therefore, the goal of rehabilitation for children with hearing loss is to improve their developmental potential and hearing to improve their quality of life (Ronner et al., 2020).

A cochlear implant (CI) is an electronic medical device that gives people with severe and profound hearing loss auditory access to spoken

sounds that cannot be provided by sound amplification through traditional hearing aids (Dazert et al., 2020).

Early CI implementation increases spoken language acquisition and encourages engagement in mainstream schools. This technology has advanced quickly since 1989 when the USA Food and Drug Administration approved cochlear implants for youngsters with severe to profound hearing loss. Cochlear implantation is the treatment of choice for children diagnosed with severe-to-profound hearing loss in the majority of developed countries (Binios et al., 2021).

The benefits of CI have been proven in several trials, including better hearing, speech perception, and language development. Additionally, CIs appear to be supportive of the psychosocial requirements for social participation, such as empathy. The use of CI in children can at least partially undo the consequences of hearing loss in the brain (Lieu et al., 2020).

The comparison of mothers' knowledge and practices of children with and without hearing loss, however, seems to lack consistency in the research. In terms of related factors, earlier research revealed that family acceptance, mothers' educational level, and older age at evaluation were all factors influencing the lives of the implanted offspring (Moradi et al., 2021).

The mother-reported quality of life for cochlear implants was compared in the retrospective analysis. The authors hypothesized that these variations might be explained by limited access to cochlear implantation and rehabilitation, cultural variations in knowledge of hearing loss, and different expectations (Warner-Czyz et al., 2022).

The pediatric and community health nurse had a pivotal role in educating mothers/parents/caregivers regarding cochlear implant surgery to improve knowledge and practice toward caring for children after surgery, this will enable mothers or / caregivers to provide care for their children, and help to have improved quality of life of children after surgery (Moradi et al., 2022).

Significance of the study:

One of the most prevalent congenital anomalies is hearing loss. After hypertension and arthritis, it is the third most common chronic disability. In the world, hearing impairment affects over 250 million people, and 75% of those individuals reside in developing nations (Almeida, et al., 2019).

There isn't a database that tracks the scope and dissemination of the hearing impairment problem in Egypt. There have been

a few scholarly studies limited to certain age groups or geographical regions. Children's hearing loss was found to be more common in Alexandria (5.3%), rural areas (4.5%), and Ismailia governorate (13.7%) (Nada et al., 2021).

Improvements in perception and production of speech and language development are only one aspect of how CI affects children and their mothers who have severe or profound hearing loss. Physical and mental health are also affected (Moradi et al., 2022). Mothers can give details about a range of situations to which children are exposed, such as school, daily routines, and familial relationships, allowing a description of CI outcomes in children. The evolution of the therapeutic intervention procedure with mothers' children can also be well evaluated. Their satisfaction is an indicator of the growth of the children and demonstrates that CI meets or exceeds intervention objectives (Dazert et al., 2020). So, the study aimed to determine the impact of instructional guidelines on the knowledge and practices of mothers having children with cochlear implantation.

Aim of the study:

This study aimed to determine the impact of instructional guidelines on the knowledge and practices of mothers having children with cochlear implantation through:

1. Assessing mothers' knowledge about cochlear implantation
2. Assessing mothers' practices about cochlear implantation
3. Designing and implementing instructional guidelines depending on the mother's needs.
4. Evaluating the effect of instructional guidelines on knowledge and practices of mothers having children with cochlear implantation.

Research hypothesis:

H₁: Mothers having children with cochlear implantation who received instructional guidelines are expected to have improved their knowledge about cochlear implantation in the study group more than that of mothers in the control group.

H₂: Post the implementation of the instructional guidelines, the mothers' practices for children with

cochlear implantation in the study group are expected to be improved than that of mothers in the control group.

Subjects and Methods:

Research Design:

A quasi-experimental research design was used to achieve the aim of the current study.

Setting:

The study was conducted in Ear, Nose, and Throat outpatient clinics at Sohag University Hospital.

Sample:

A convenient sample included all available 200 mothers and 200 children (2 to 5 years) after cochlear implantation who attended the previously mentioned settings at Sohag University Hospital within six months and were divided equally into two groups, (control group and study group).

Tools for data collection:

Three tools were utilized for collecting data in the current study.

Tool I: Structured interview questionnaire sheet: It consisted of two parts:

Part I: Mothers' Personal Data:

This part was concerned with studying mothers' characteristics such as age, marital status, level of education, occupation, and residence.

Part II: Children's personal data:

This part was concerned with studying children's characteristics such as age, gender, type of hearing impairment, and presence of chronic diseases.

Tool II: Mothers' knowledge about cochlear implantation (pre/post):

This tool was developed by the investigator after reviewing the national and international related literature (Muller et al., 2023; Warner-Czyz et al. 2022; Nada et al. 2021). It was designed by the researchers to assess mothers' knowledge about cochlear implantation

It included 14 questions related to the meaning of hearing impairment, signs, and symptoms of

hearing impairment, the definition of a cochlear implant, cochlea location, cochlear implant process, the ideal age for cochlear implant, the specifications of people who are qualified for cochlear implants, the advantages of cochlear implantation, the benefits of cochlear implantation, the side effects of cochlear implantation, the complications of cochlear implantation in some cases, the effect of MRI on cochlear implantation, how long does a cochlear implantation take, and how can the results of the operation be better utilized.

Scoring System:

The mother's answers related to their knowledge were scored and calculated. Each question had several correct answers and the studied mothers were asked to select all the corrected answers, and the mean score for each question was calculated.

Total knowledge was scored as follows:

Unsatisfactory knowledge -----<60% of total knowledge score.

Satisfactory knowledge -----≥ 60 total knowledge score.

Tool III: Mothers' self-reported practice for their children with cochlear implantation (pre/post):

It was used to evaluate mothers' self-reported practice about caring for their children with cochlear implantation; it was developed by researchers after reviewing the local and international related literature (Warner-Czyz et al. 2022; Nada et al. 2021), it included 6 questions related to feeding, nutrition, hygiene, speaking, communication and education.

Scoring System:

Mother self-reported practice response to each practice statement to care for their children after cochlear implantation was scored as (done = 1, not done = 0).

The total self-reported practice score was determined as:

Inadequate practice -----<60% of total practice score

Adequate practice-----≥60% of total practice score

Validity:

The study tools were revised for clarity,

relevance, comprehensiveness understanding, and applicability by a panel of five experts from faculties of nursing, three experts in the pediatric nursing field, and one expert from community health nursing, to measure the content validity of the tools and no modification was done.

Reliability:

The reliability of tools was done through the use of the Cronbach alpha test to confirm its consistency. It was 0.876 for the knowledge tool and 0.897 for self-reported practice.

Ethical consideration:

- Approval to carry out this study was obtained from the dean of the faculty of nursing, at Sohag University. Ethical approval was obtained from the scientific research ethical committee of the faculty of nursing, at Sohag University and official permission was obtained from the director of the previously selected setting at Sohag University Hospital for conducting the study.
- Consent was obtained from all the studied mothers after the explanation of the purpose and the nature of the study was explained before the interview. The investigator emphasized that participation in the study is entirely voluntary; anonymity and confidentiality were assured through coding the data and they have the right to withdraw at any time.

Pilot study:

A pilot study was conducted on 10% of the studied mothers having children with cochlear implantation to assess the feasibility of the study as well as the clarity and objectivity of the tools. The needed modification was incorporated and those subjects were excluded from the actual study sample.

Data collection procedure

After reviewing past, current, national, and international related literature and theoretical knowledge of various aspects of the study using books, articles, the internet, periodicals, and magazines the researcher developed the tool of data collection.

Data was collected from May 2022 to the end of October 2022. After getting ethical and

administrative approval, the purpose of the study was explained to all studied mothers, and consent was obtained from each mother to participate in the study, the researcher visited the setting of the study 2 days per week, to collect data, data was completed within six months. For the first 3 months' data was collected from the control group, and for the 2nd 3 months' data was collected from the study group to reduce bias during data collection.

For the control group mothers were instructed according to the hospital instructions after cochlear implantation, the investigator explained the data of the questionnaire to the studied mothers and the needed time to complete this questionnaire was about (30 -45) minutes.

The study was conducted through four phases' assessment, planning, implementation, and evaluation.

Assessment phase: before starting the designed intervention program, the study tools were applied to assess the studied mothers' knowledge and self-reported practice regarding cochlear implementation

NB; the data obtained during this phase from control group participants and considered as the basics for the content of instructional guidelines

Planning phase:

After identifying the needs of the studied mothers from the assessment phase, the investigator started to develop the program items (session times, course outline, course content, methods of teaching and education, design of the program, and booklet).

Implementation phase:

For the study group: the researcher provided the studied mothers with essential knowledge and required practices to care for their children after cochlear implantation.

The investigators prepared suitable teaching methods (lecture, role play, discussion) and prepared suitable assistance aids (booklet, PowerPoint, posters) especially for each session of the program.

The instructional guidelines aimed to improve the knowledge, and practice of mothers having children with cochlear implantation.

Specific objectives: At the end of instructional guidelines implementation each mother should be able to:

- Explain the definition of the hearing loss
- List the causes and risk factors for hearing loss.
- Discuss the symptoms of hearing loss
- Recognize hearing loss diagnostic tests.
- Explain how to handle hearing loss.
- Describe ways to avoid hearing loss.
- Define cochlear implantation
- Identify the significance of cochlear implantation.
- Recognize the elements linked to successful cochlear implantation outcomes.
- Describe the ideal moment for the cochlear to activate its function.
- Describe the cochlear activation techniques.
- Explain the potential dangers of cochlear implantation.
- List the drawbacks associated with cochlear implantation.
- Describe ways to adopt a healthier lifestyle following cochlear implantation.
- Administer post-operative care right away following cochlear implantation

- The content of the program was administered in four sessions: two for theoretical learning and two for practical learning.
- Mothers had the chance to ask questions and share information during the sessions.
- The program's training session took place in a separate comfortable, organized room.
- Each theoretical and practical lesson lasted 45 to 60 minutes, three days per week. The researchers began each session with a recap of the previous one and a discussion of the goals for the upcoming one, keeping in mind that the Arabic language would be more appropriate according to the educational level of the mothers.
- Knowledge and practice-based instructional guidelines were applied and implemented with educational materials such as Photos, videos, and PowerPoint presentations. Arabic brochure designed by the researchers

Instructional guidelines evaluation: After the implementation of the program, the researcher reassessed the mothers' knowledge and self-reported practice using the same tools in the pretest.

Statistical Analysis

The statistical analysis of data was done by using the computer software Microsoft Excel

Program and Statistical Package for Social Science (SPSS) version 25. Data were presented using descriptive statistics in the form of frequencies and percentages for categorical data, and the arithmetic mean and standard deviation (SD) for quantitative data. Qualitative variables were compared using chi-square test (X^2). Differences between the groups during the two visits were assessed by paired t-test. In addition, R- R-R-tests were used to identify the correlation between the study variables and measure the statistical significance of the study.

Significance of the results: -

- * Statistically significant $p < 0.05$
- * Highly statistically significant $p < 0.001$
- * Not significant $P > 0.05$

Results

Table (1): Represents that 58 %, and 42% of the studied mothers in both control and study groups respectively from the age group 20-<30 years, with a mean of 30.89 ± 7.76 and 30.98 ± 8.56 among the study and control groups respectively. Furthermore, 68% and 86% of the studied mothers in the control and the study groups respectively lived in rural residences, and 35% and 52% of the studied mothers in the control and the study groups respectively had a secondary level of education. Moreover, 70% & 74% of the studied mothers in the control and the study groups respectively were housewives. In addition, there was no significant difference between the control and study groups' mothers regarding their age, educational level, residence, and occupation $p (>0.05)$, which reveals homogeneity among the studied groups.

Table (2): Indicates that more than half (58% & 55%) of studied children in the control and the study groups respectively ranged from two to less than 3 years old with a mean of 3.24 ± 0.89 and 3.44 ± 0.67 for both control and study groups. Furthermore, 62% & 75% of the studied children were girls in the control and study groups respectively, and 46% and 35% of the studied children were the second child among family children in the control and the study groups respectively.

Moreover, there was no significant difference between the study and the control groups' children's data, including their age, gender, and

their birth order ($p > 0.05$).

Figure 1: Portrays that the majority (90%) of the studied mothers had not received any training regarding cochlear implementation.

Figure 2: Illustrates that the majority (85%) of the studied mothers reported that their main source of knowledge about cochlear implementation was doctors.

Table (3): Shows that there was a highly significant difference between the knowledge of the studied mothers in both control and study groups as the mothers in the study group had higher knowledge mean scores in all knowledge items than mothers in the control groups post instructional guidelines (p -value $< 0.001^{**}$).

Figure 3: illustrates that the majority (92%) of the studied mothers in the study group had an unsatisfactory level of knowledge regarding cochlear implantation pre-instructional guidelines as compared only with 15% post-instructional guidelines. On the other hand, the majority of the studied mothers (85%) in the study group had a satisfactory level of knowledge regarding cochlear implantation post-instructional guidelines with highly statistically significant improvement and differences between pre/post instructional guidelines.

Table (4): Shows the mothers' self-reported practice regarding caring for their children after cochlear implantation surgery which was implemented highly by the mothers in the study group compared with mothers in the control group with highly statistically significant

differences between both groups at P -value post instructional guidelines ($< 0.001^{**}$).

Figure 4 illustrates that 83% of the mothers in the study group had an inadequate level of practice pre-instructional guidelines as compared with only 25% post-instructional guidelines. On the other hand, only 17% of the mothers in the study group had an adequate level of practice pre-instructional guidelines as compared with three-quarters (75%) post-instructional guidelines. This figure also shows highly statistically significant improvements and differences in the total practice level in pre/post instructional guidelines in the study group, while there was no difference in the total practice level pre/post instructional guidelines in the control group

Table (5): Indicates that there was a highly statistically significant positive association between the studied mothers' knowledge and self-reported practice regarding cochlear implantation in the study group.

Table (6): Shows a significant correlation between knowledge and practice regarding Cochlear implantation among the studied mothers and their selected personal data (age, relative parents, educational level, occupation, and residence) in the study group post-instructional guidelines.

Table (1): Personal data distribution among the studied mothers in different groups (n= 200).

Personal data	Control group		Study group		Chi-square	P value
	No	%	No	%		
Age in years						
20-<30	58	58.0	42	42.0	2.72	>0.05
30-<40	20	20.0	26	26.0		
40-50	22	22.0	32	32.0		
Mean ±SD	30.89±7.76		30.98±8.56			
Relative parents						
No	50	50	48	48	4.89	>0.05
1 st -degree relation	34	34	22	22		
2 nd -degree relation	16	16	30	30		
Residence						
Urban	68	68	86	86	0.229	>0.05
Rural	32	32	14	14		
Educational level						
Illiterate	4	4	4	4	4.59	>0.05
Basic	30	30	20	20		
Secondary	36	36	52.	52.		
University	30	30	24	24		
Occupation						
Working	30.0	30.0	26.0	26.0	2.44	>0.05
Housewife	70.0	70.0	74.0	74.0		

Table (2): Personal data distribution among the children of the studied mothers in different groups (n= 200).

Personal data	Control group		Study group		Chi-square	P value
	No	%	No	%		
Age in years						
2-<3 years	58	58	55.0	55.0	1.02	>0.05
3-5 years	42	42	45.0	45.0		
Mean ±SD	3.24±0.89		3.44±0.67			
Gender						
Boys	38	38	25	25	3.75	>0.05
Girls	62	62	75	75		
Birth order						
First	30	30	32	32	4.30	>0.05
Second	46	46	35	35		
Third or more	24	24	33	33		

*statistical significant

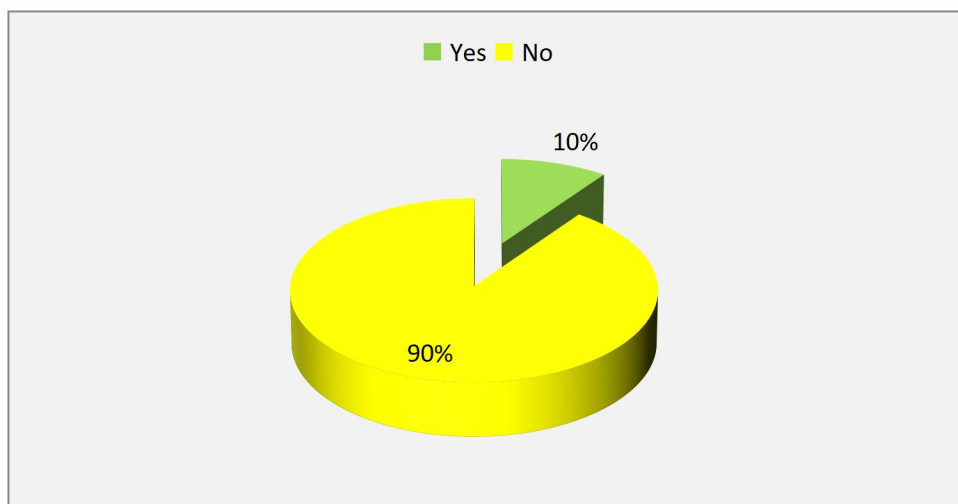


Figure 1: The studied mother's distribution regarding their previous training regarding cochlear implantation (N = 200)

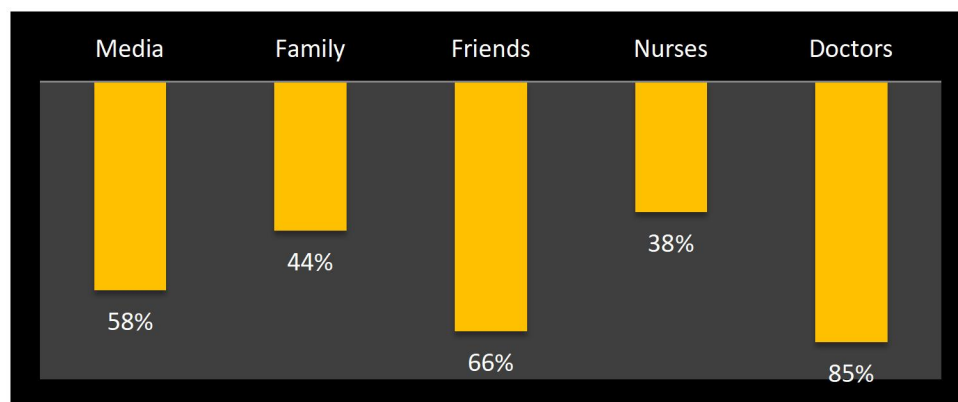


Figure 2: Distribution of the studied mothers regarding their source of knowledge about cochlear implantation (N=200)

Table (3): Differences in the knowledge mean score regarding cochlear implantation between the studied mothers in the control and the study groups post instructional guidelines of cochlear implantation (n= 200).

Knowledge	Control group	Study group	Paired t-test	P value
	Mean \pm SD	Mean \pm SD		
The structure of the ear	2.66 \pm 1.34	2.98 \pm .78	5.043	<.001**
The cochlea located	1.63 \pm 1.45	2.87 \pm .86	5.056	<.001**
A cochlear implant process	1.22 \pm .78	1.85 \pm .82	3.188	<.001**
The ideal age for cochlear implants	.89 \pm .76	1.66 \pm .68	5.032	<.001**
The people who undergo a cochlear implant	1.66 \pm 1.87	2.47 \pm .73	7.733	<.001**
The specifications of people who are qualified for cochlear implants	1.57 \pm 1.88	2.46 \pm .86	6.522	<.001**
The advantages of cochlear implantation	1.34 \pm 1.43	1.85 \pm 1.76	3.414	<.001**
The benefits of cochlear implants	1.77 \pm 1.56	1.69 \pm 1.23	3.256	<.001**
The side effects of cochlear implants	1.39 \pm 1.48	2.84 \pm 1.24	5.272	<.001**
The complications of cochlear implantation in some cases	1.67 \pm 1.99	1.80 \pm 1.45	3.367	<.001**
The effect of MRI on cochlear implants	.96 \pm 1.67	1.73 \pm 1.76	4.344	<.001**
The results of cochlear implantation	1.25 \pm 1.55	1.56 \pm 1.62	3.877	<.001**
Time a cochlear implant takes	.95 \pm 1.67	1.78 \pm .49	6.725	<.001**
How can the results of the operation be better utilized?	1.77 \pm 1.66	1.73 \pm 1.69	2.621	<.0.05*

*statistical significant

**highly statistical significant

Note. * $p \leq 0.05$, ** $p \leq 0.001$, Not significant ($p > 0.05$)

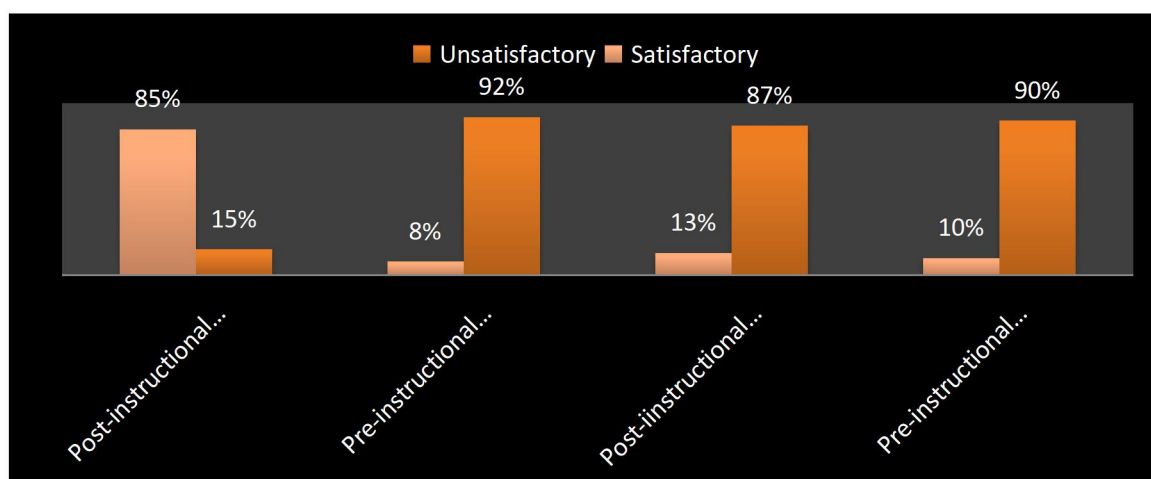


Figure (3): Total knowledge levels among the studied mothers in study and control groups regarding instructional guidelines of cochlear implantation (pre and post) (N= 200)

Table (4): The studied mothers' practice distribution regarding the care of children under cochlear implantation surgery in both control and study groups post instructional guidelines of cochlear implantation (n= 200).

Practice	Control group				Study group				Chi-square Test	P value
	Done		Not done		Done		Not done			
	No	%	No	%	No	%	No	%		
Feeding	78	78	22	22	100	100	0	0.0	23.26	<0.001**
Nutrition	56	56	44	44	84	84	16	16	17.43	<0.001**
Hygiene	52	52	48	48	100	100	0	0.0	47.35	<0.001**
Speaking	66	66	33	33	100	100	0	0.0	28.64	<0.001**
Communication	58	58	42	42	86	86	14	14	16.75	<0.001**
Education	36	36	64	64	100	100	0	0.0	73.62	<0.001**

*statistical significant

**highly statistical significant

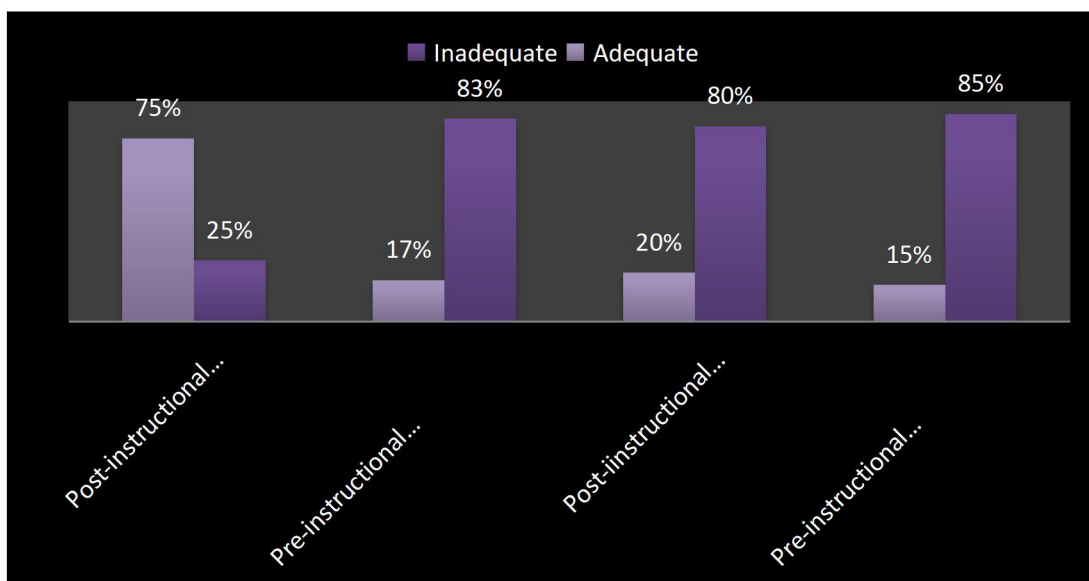


Figure (4): Total practice level distribution among the studied mothers in both control and study groups during pre /post instructional guidelines (n=200).

Table (5): Correlation between the study and control groups' knowledge and practice regarding Cochlear implantation

Variables	Mothers reported practice			
	Control group		Study group	
	R	P value	R	P value
Knowledge	0.149	>0.05	0.540	<0.001**

Table (6): Correlation between total knowledge and practice regarding Cochlear implantation among the mothers and their selected personal data in the study group post instructional guidelines (n= 100).

Items		Knowledge	Practice
Mothers' age	R	.535-	.375
	P – value	.0001**	.007**
Relative parents	R	.536	.503
	P – value	.0001**	.0001**
Mothers' educational level	R	-.558	.421
	P – value	.0001**	.001**
Mothers' occupation	R	.471	.336
	P – value	.0001**	.017*
Mothers' residence	R	.445	.494
	P – value	.0001**	.0001**

** . Correlation is significant at the 0.01 level* . Correlation is significant at the 0.05 level

Discussion

One of the most prevalent disabilities is hearing impairment, which affects children and their families for the rest of their lives. Parents of children with hearing impairments typically experience depression and feel unfit to effectively and efficiently raise their children. This self-doubt manifests itself as an affliction frequently (**Dazert et al., 2020**).

To support children's psychological and intellectual development, nurses and other professionals should maintain the degree of parental participation as well as the timing, quality, and quantity of care services they get. The cochlear implant surgery impact on children with severe and/or profound hearing loss extends beyond the improvement in hearing and language skills and speech production and perception (**Zhang et al., 2020**).

As regards the personnel characteristics of the studied mothers, the present study revealed that there was no significant difference between the control and study groups' mothers regarding their age, educational level, residence, and occupation, which reveals homogeneity among the studied groups $p (>0.05)$. These findings agreed with (**Muller, 2023**) who evaluated outcomes for educational placement and quality of life in a prospectively recruited multinational cohort of children with cochlear implants" and stated that the studied mothers' mean age was 30.64 ± 7.69 in the study with no statistical difference regarding the studied caregiver personnel characteristics.

In a similar vein, **Tork et al. (2022)** noted that the parents under study were the same age. Furthermore, **Zhang et al. (2020)** discovered that slightly over 75% of the mothers in the age group of 25–30 years, and the majority of the studied mothers were housewives.

Regarding the personnel characteristics among the studied children, the result of the current study revealed that there was no significant difference between the study and control groups' children's data including their age, gender, and their birth order, which revealed homogeneity among the studied groups.

These findings are in the same line with

(**Warner-Czyz et al., 2022**) at Texas University, who studied "Parent-reported quality of life in children with cochlear implants differs across countries " and stated that there was no statistically significant difference between studied children in different studied groups. Moreover, (**Alnuhayer et al., 2020**), in Saudi Arabia, who studied "the effect of cochlear implants and quality of life " revealed that there was no statistically significant difference regarding personnel characteristics of the studied children.

The result of the current study revealed that almost all of the studied mothers had not received any training regarding cochlear implantation. From the researchers' point of view, it confirmed the need to implement the instructional guidelines to meet the mothers and their children's needs.

The result of the current study presented that the majority of the studied mothers reported that their main source of knowledge about cochlear implantation was from doctors. From the researchers' point of view, it reflected the significance of medical guidance in preserving health.

The findings of this study showed that there was a highly significant difference between the knowledge of the studied mothers in both control and study groups as the mothers in the study group had higher knowledge mean scores in all knowledge items than mothers in the control groups. The current study findings supported the study hypothesis. According to the researcher's point of view, this demonstrated the positive effects of providing instructional guidelines for the studied mothers to increase their knowledge. Also, The present study's researchers believed that understanding the nature of the illness lessens the abnormal practices of mothers and that giving mothers the knowledge and tools they need to feel more in control of their lives which important because it improves the outcomes for both the mothers and their ill children.

The present study findings also, revealed that the majority of the studied mothers in the study group had satisfactory knowledge levels

after the implementation of the instructional guidelines about cochlear implantation compared to those in the control group. These findings were similar to **Aylward et al., (2022)**, who added that educational intervention improved knowledge among the studied caregivers. Additionally, these findings agreed with **Suskind et al., (2019)** who studied "Curriculum for spoken language intervention for parents of low-income children who are deaf or hard of hearing" and the findings indicated that the program had a positive effect on most participants' parental knowledge of their children's language development after the training.

Furthermore, **Tork et al., (2022)**, pointed out that there was a highly statistically significant difference between the levels of knowledge of the studied parent after the implementation of the educational program regarding the care of children after cochlear implantation surgery.

According to the results of the current study, there was a significant improvement in the studied mothers' reported practice in the study group regarding caring for their children after cochlear implantation surgery post-instructional guidelines. This may be due to the instructional guidelines that improve knowledge among mothers in the study group. on the other hand, mothers in the control group had routine care for their children. These findings are in the same line with **Wright et al., (2021)**, at York University, the study assessed a systematic scoping review of early interventions for parents of deaf infants and verified that the training program worked well to increase the overall practice of parents, encourage communication-enhancing behaviors, and decrease communication-inhibiting behaviors in PT parents. A study by **Nada et al. (2021)** titled "Parent Training and Communication Empowerment of Children with Cochlear Implant" also reported that before the educational program, there were no differences between the children with cochlear implants in the PT group and the control group. CI children whose parents attended the training showed greater gains in word and sentence production after the group sessions, and the parents' performance in terms of

caring for their kids was noticeably better than that of the control group.

Additionally, a highly statistically

significant improvement in parents' reported practice regarding the care of their children after cochlear implantation post-empowerment program implementation was noted by **Tork et al. (2022)**, in Egypt, in a study to evaluate the impact of empowerment programs on parents' self-competence regarding the care of their children with cochlear implantation.

The present study findings demonstrated that there was a highly significant positive correlation between the studied mothers' knowledge and self-reported practice in the study groups. These findings may be due to the improved knowledge and practice of the studied mothers that enabled them to understand well their children's needs, and support and assess them to provide care that was based on a scientific base. These findings agreed with **Moradi, (2022)**, in Iran, the study assessed the rehabilitation of children with cochlear implants, the study stated that the rehabilitation program for children after cochlear implant surgery improved post-instructional guidelines. These findings were in the same line with **Tork et al., (2022)**, who illustrated that there was a highly statistically significant association between studied parents' knowledge and practice.

Finally, this association between mothers' knowledge and practice implies that good knowledge necessarily leads to good practice. From the researchers' point of view, it reflected that a knowledge deficit leads to inadequate practices and the improvement of the knowledge positively affected the practice. This result reflected the benefit of administering the instructional guidelines, which met the mother's needs and provided them with sufficient knowledge and practice to cope with this disease. Additionally, reflected the success of the study's aim.

Conclusion

Based on the results of the present study, it was concluded that there was a highly statistically significant difference between the

study and control group regarding knowledge and self-reported practice ($p < 0.001$) after instructional guidelines implementation.

The instructional guidelines positively improved knowledge and reported practice of mothers having children with cochlear implantation.

Recommendations

The following recommendations are made in light of the current study's findings:

- Instructional guidelines for mothers about caring for their children after cochlear implantation are very recommended.
- Provide continuous updated educational programs for mothers regarding the care of children post cochlear implantation.
- To promote efficient adherence to the care plan, mothers and all children with hearing impairments should receive written instructions about cochlear implantation in the form of booklets or brochures.
- Regular screening, especially to prevent major effects and enable early discovery in children with a family history of hearing impairment.
- Regular training for parents on communication and support techniques for their deaf children wearing cochlear implants.
- Replication of the study is essential to ensure generalizability of the results.

Limitations of the study

The small sample size of the study limits the generalizability of the study findings, and additional research with a larger sample size is warranted. To gain a deeper understanding of the cochlear implant, conducting a more comprehensive survey of specific subdomains may be beneficial.

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