Effect of Educational Program on Mothers' Awareness Regarding Care of Their Children with Congenital Hypothyroidism

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Abstract

Background: Congenital hypothyroidism (CH) one of the most common preventable causes of intellectual disability. **Aim:** To evaluate the effect of educational program on mothers' awareness regarding care of children with congenital hypothyroidism. **Subject and Method:** One group pre-posttest quasi experimental research design was used to achieve the aim of the current study. **Setting:** The study was conducted at the thyroid gland clinic of Al-Mabarrah Model clinic affiliated to Health Insurance Organization at Minia governorate. **Sample:** A purposive sample composed of 50 mothers having children with congenital hypothyroidism. **Three tools: Tool I:** Structured interview questionnaire sheet; consisted of three parts, Part 1: Bio-demographic characteristics of mothers. Part 2: Bio-demographic characteristics of the studied children. Part 3: Mothers' knowledge about congenital hypothyroidism. **Tool II:** Mothers' reported practices about congenital hypothyroidism. **Tool III**: Mothers' attitude regarding congenital hypothyroidism. The program had done over 3 months extending from the beginning of April to the end of June 2024. **Results**: It was found that all of mothers had satisfactory level of knowledge and attitude in post-program compared to one quarter pre-program. On the other hand; the minority of the studied mother had satisfactory level of self-reported practices pre-program compared to all of them post-program. **Conclusion**: Educational program contributes to improvement in mothers' awareness regarding care of children with congenital hypothyroidism evidenced by higher level of knowledge, reported practices and attitude of mothers in post-program compared to pre-program with statistically significant differences. **Recommendations:** Periodical educational training program for mothers at the hospital regarding care of their children with congenital hypothyroidism should be conducted

Keywords: Awareness, Children, Congenital Hypothyroidism, Mothers.

Introduction:

Congenital hypothyroidism (CH) is a significant endocrine disorder that results from insufficient production of thyroid hormones in newborns. This condition can lead to severe and irreversible neurodevelopmental delays if not diagnosed and treated promptly. Early detection and treatment of CH are paramount to preventing adverse outcomes **(Alwadani et al,. 2025).**

The incidence of Congenital hypothyroidism(CH) ranges from approximately 1 in 2000 to 1 in 4000 newborn infants in countries from which newborn screening (NBS) data are available. This incidence is significantly higher than that reported in the early years of NBS (around 1 in 4000), primarily because of changes in screening strategies that have led to increased detection of milder cases of CH. Genetic factors may also be influential as data suggest that CH is more common in certain populations **(Liu, et al,. 2023)**. There is a 1.5 to 2-fold greater incidence in females than in males of thyroid ectopia (but not of agenesis or dyshormonogenesis), Girls have a higher incidence rate of CH than boys (female to male ratio 2:1) and there is an increased risk for CH in infants with trisomy 21 **(Rose, et al,. 2023).**

Congenital hypothyroidism (CH) is a thyroid hormone defect and can be classified based on the site of dysfunction into **primary** (thyroidal), if the defect concerns the thyroid gland; **central**, if the hypothalamo– pituitary axis is involved and **peripheral**, if the defect concerns thyroid hormone

(TH) metabolism, action, transport, and sensitivity. It can also be classified as permanent or transient based on the cause of thyroid dysfunction, as well as isolated or syndromic, if other congenital abnormalities are associated **(Stoupa et al 2022).**

Symptoms and signs suggestive of congenital hypothyroidism include the following, in infants (0days of life) the symptoms include cardiac malformations, delay in skeletal maturation, hypothermia, jaundice, lethargy/decreased activity, macroglossia, macrosomia, mottled and dry skin, open and wide posterior fontanelle (>2 cm), poor feeding, umbilical hernia, wide anterior fontanel. In the early infancy (0–2 months of life), the symptoms include constipation, decreased muscle tone, failure to thrive, hoarse cry, linear growth deceleration, poor feeding, prolonged jaundice. But in late infancy (>2 months of life) the symptoms include delayed tooth eruption, growth failure, pseudo muscular hypertrophy, psychomotor retardation **(Jones& Rose., 2024).**

Congenital hypothyroidism is traced by neonatal screening tests, neonatal screening for CH can be conducted using various methods, including heel-prick blood sampling (the Guthrie test) and cord blood sampling (less accurate). The heel-prick test is widely used and is considered the gold standard for neonatal screening due to its high sensitivity and specificity, performed between 48 and 72 hours after birth and involves collecting a small blood sample from the newborn's heel, which is analyzed for TSH and thyroxin T4 levels The presence of any hormonal imbalance must be proved with confirmatory tests, which must be performed as early as possible, ideally between the first and second weeks of the newborn's life **(Alwadani et al,. 2025).**

Congenital hypothyroidism is one of the most common predictable causes of mental retardation in children, develop intellectual disability, brain disorder and injury, nerve growth retardation are very subtle and are not recognizable in infancy and can be recognized when it is too late for treatment or prevention. Developmental disorders such as poor motor coordination, imbalance, muscle spasticity, eye aberrations, learning difficulties, autistic behavior, vision and hearing problems, problems with memory and attention, and may lead to stunted growth pattern and short stature, so that early diagnosis and treatment can prevent catastrophic consequences **(Nazari, et al., 2021).**

Nurses caring for the neonates must be certain that screening of CH is performed, they must be aware of the earliest signs of CH, they remark parents about symptom which requires a referral for specific tests, and explain to parents the disorder and the necessity of lifelong treatment. Nurses stress on the importance of compliance with the drug regimen for the child to achieve normal growth and development, they have a major role in caring of newborn infants including physical examination, assessing growth and development, instruct parents about the benefit of early diagnoses in preventing mental retardation and appropriate administration of therapy, they educate parents to seek follow-up to check the level of thyroid hormone frequently, they inform parents to be aware of signs indicating overdose of medication, such as a rapid pulse, dyspnea, irritability, insomnia, fever, sweating, and weight loss **(Hockenberry, et al,.2022).**

Mothers should be learned about the importance of newborn screening program as increasing mothers' awareness about newborn screening lead to increased awareness of the child's health status and reduced the harm of physical and psychosocial impact, she should go to all follow-up doctor visits, monitor thyroid hormone levels frequently, they should be learned about the importance of proper medication administration. They should be aware of any change in mental devolpment and any signs and symptoms of CH, they talk to the doctor if they have any concerns about child's hearing or speech development and monitor psychomotor development **(Brito, et al,. 2021).**

Significance of the study:

Congenital hypothyroidism (CH) is the most common preventable cause of mental retardation worldwide. Corresponding to worldwide data obtained from neonatal thyroid screening programs, CH occurs with an incidence of 1: 3,000 to 1:4,000 live births. However, the incidence changes according to geographic location, ethnicity, and environmental factors **(Venugopalan et al., 2021).**

According to the WHO, iodine deficiency disorders (idds), affect more than one billion people around the world **(Lisco, et al,. 2023).** Congenital hypothyroidism affects approximately one in every 1,400 babies in the Middle East. In Egypt, where there are 2.6 million births per year, an estimated 1,857 children are born with congenital hypothyroidism **(Abel Malek, et al., 2022).** The prevalence in Egypt is about 1: 2500 newborn infants **(Ragab, et al,. 2020).**

In Egypt congenital hypothyroidism was selected for initiating newborn screening programs because of its high prevalence, availability of screening methods, and cost -effective intervention. Congenital hypothyroidism (CH) is the most common cause of preventable mental retardation and occurs in 1 in 2000 – 4000 newborns. It can be either permanent or transient. The UNICEF categorized Egypt as one of the countries with low iodinated salt consumption with large number of neonates exposed to iodine deficiency **(Badawe et al., 2024).**

Numerous researches have been conducted to ascertain that mothers have deficient knowledge, practices and attitude regarding care of their children with congenital hypothyroidism. According to the study done by **Ez Eldeen Mahgoub *et al.*, (2021)** "Mothers' Knowledge and Practice regarding Care of their Children with Congenital Hypothyroidism" found that there were deficient in mothers knowledge and self-reported practices regarding congenital hypothyroidism. The more the mother's knowledge increased, the higher the level of correct practices in caring for their children, as well as the increase in the mother's attitudes towards their children, therefore; educational program have done to improve their awareness regarding care of their children with congenital hypothyroidism.

Aim of the study:

This study was aimed to evaluate the effect of educational program on mothers' awareness regarding care of their children with congenital hypothyroidism.

Research hypotheses:

To fulfill the aim of the current study the following research hypotheses were tested:

- H1: The mothers who will receive educational program about care of children with congenital hypothyroidism will have higher level of knowledge than mothers in pre-program.
- H2: The mothers who will receive educational program about care of children with congenital hypothyroidism will have higher level of practices than mothers in pre-program.
- H3: The mothers who will receive educational program about care of children with congenital hypothyroidism will have more positive attitude than mothers in pre-program.

Research Design

One group (pre-posttest) quasi experimental research design was utilized to achieve the aim of the current study.

Setting

The study was conducted at the thyroid gland clinic which located on the third floor of Al-Mabarrah Model clinic affiliated to Health Insurance Organization at Minia governorate which consists of four floors, thyroid gland clinic provide the children with many services like diagnosis, treatment and follow-up.

Sample

A purposive sample composed of 50 mothers having children with congenital hypothyroidism. According to the statistical equation in which the sample size was 10% from the total diagnosed children size, the number of discovered samples of children at the thyroid gland clinic in the Health Insurance Hospital was 500 children diagnosed with congenital hypotyhrodism in 2022.

N= nx 10-30/100 (N= sample size n=total number of population) **(Isaac &Micheal 1995).**

Data collection tools:

Three tools were used to conduct this study.

Tool *I*: Structured interview questionnaire sheet: It was developed after reviewing the related literature and it consisted of 3 parts as the following:

Part 1: Bio-demographic characteristics of mothers: It was consisted of (12) questions such as Age, educational level, occupation and residence, history of consanguinity of parents, number of children, follow-up for the last pregnancy, received health education during the last pregnancy for congenital Hypothyroidism, history of chronic illness, and history of hypothyroidism among the parents.

Part 2: Bio-demographic characteristics of the studied children: It was consisted of (5) questions such as, age, gender, birth order, history of hypothyroidism among the sibling and duration child suffering from hypothyroidism.

Part 3: Mothers' knowledge about congenital hypothyroidism: Adopted from **(Ez Eldeen Mahgoub et al.,2022 & Ramadan et al., 2014)**, It was consisted of (58) questions, it was

filled by the researcher to assess knowledge related to congenital hypothyroidism as; meaning 3 items , site 3 items and function of thyroid gland 4 items, types of hypothyroidism in children 3 items, definition of congenital hypothyroidism 3 items, symptoms 7 items , causes 4 items , time that the first sample should be taken to detect congenital hypothyroidism 3 items, problem caused by lack of thyroid gland 4 items, complications 3 items, tests required for diagnosis 4 items, follow-up test of thyroid hormone 4 items, treatment of congenital hypothyroidism 4 items, foods that can improve the function of the thyroid gland 5 items, follow-up of doctor visits 4 items.

Scoring system of mothers' knowledge

Total number of questions are (58), all knowledge variables was weighted upon completion of the interview questionnaire sheet where, the studied sample knowledge was checked with a model key answer for correct complete answer (2) Scores, correct incomplete answer (1) score and (0) score for incorrect**.** These scores was summed and converted into a percent score. The total score of questionnaire was (116) grades (equal 100%). The total scores for all items related to knowledge were classified as the following:

- Satisfactory knowledge: If mothers' knowledge (≥60%) of total knowledge scores.
- Unsatisfactory knowledge: If mothers' knowledge (<60%) of total knowledge score (Ez Eldeen Mahgoub et al.,2022).

Tool *II*: Mothers' reported practices about care of their children with congenital hypothyroidism: Adopted from **(Ez Eldeen Mahgoub et al., 2022 & Abdelmonem, et al., 2023)**, it was filled by the researcher to assess mothers' reported practices regarding their children with congenital hypothyroidism such as nutrition 5 items, follow-up 21 items, treatment 8 items, and monitoring physical activity 4 items.

Scoring system of mothers' reported practices

Total numbers of practices are (38 items), the mothers' reported practices were calculated for each item as follows; done practices took (1 score), not done practices took (zero score). Total score of practices was (38) grades (equal 100%). The total score for all items related to practices was classified as the following:

- Satisfactory practices: If mothers 'reported practices (≥60%) of total reported practices score.
- Unsatisfactory practices: If mothers 'reported practices (<60%) of total reported practices score **(Ez Eldeen Mahgoub et al., 2022).**

Tool *III*: Mothers' attitude regarding their child with congenital hypothyroidism. Adopted from **(Abdelmonem, et al,. 2023),** with some modification from the researcher to assess mothers' attitude regarding their children with congenital hypothyroidism which consist of 8 items such as; think that the thyroid screening program is useful, neonatal screening is important, screening result will make you feel guilty, newborn screening program is useful even if the disease does not improve, giving your child treatment daily and regularly is useful, following up visits of your child with congenital hypothyroidism with doctor is always useful, laboratory tests for the child to follow up his condition are useful, increasing your awareness about hypothyroidism is useful

Scoring system:

The answers to these questions were scored as "2" for always," "1" for sometimes, and "0" for never, the item number 3 was reverse coded. These scores was summed and converted into a percent score. The total score of questionnaire was 16 grades (equal 100%). The total score for all items related to attitude was classified as the following:

- Positive attitude: If mothers' attitude (≥50 %).
- Negative attitude: If mothers' attitude (<50%).

Validity and reliability

Validity

Five experts in pediatric nursing assessed the content validity of the data collection tool. Modifications for the tools were done according to the experts' judgment on the clarity of sentences, appropriateness of content, and sequence of items.

Reliability

Reliability of the tools was performed to confirm the consistency of the tools. The internal consistency was measured to identify the extent to which the items of the tools measured the same concept and correlated with each other by Cronbachs alpha test that revealed good internal reliability for the tools; and distributed as follows:

Tool	Cronbachs alpha
Tool I: Mothers knowledge regarding to congenital hypothyroidism	0.76
Tool (II): Mothers self-reported practices regarding congenital hypothyroidism	0.95
Tool (III): Attitude of Mothers regarding to congenital hypothyroidism	0.70

Ethical considerations

Research proposal approved from ethical committee in faculty of nursing, before the conduction of the pilot study as well as the actual study, an official permission and consent obtained from the dean of the Faculty of Nursing, as well as the director of the previously mentioned hospital. Written consent obtained from the mothers that are willing to participate in the study, after explaining the nature and purpose of the study. Mothers had the right to refuse to participate and or withdraw from the study without any rational any time and no health hazards was presented. Participants assured that all their data are highly confidential, anonymity also assured through assigning a number for each mothers instead of names to protect their privacy.

Pilot study

After having the ethical approval and permission to access the hospital, a pilot study conducted on a sample of 10% (5) of the mothers to test the study process and to evaluate the efficiency of tools that was used in the study. There were no necessary modifications was done, so, the pilot cases were included in the study.

Procedure of data collection:

The researcher reviewed current and past, local, and international related literature and theoretical knowledge of various aspects of the study using books, articles, journals, and the internet to prepare the tools of data collection, then determined a suitable time to collect the data and confirm days and times suitable to conduct the study. After that, the researcher met the mothers and arrange with them to complete the study tools, the program had done over 3 months extending from the beginning of April to the end of June 2024.

The educational program:

The proposed program was conducted through the following phases:

1- Assessment phase

The researcher explained the nature and the purpose of the study to the mothers who participated in the study after that, mothers exposed to the pre-test, the researcher collected questionnaire sheet which include the biomedical data of mothers, Biomedical data of the studied children and the knowledge of mothers regarding congenital hypothyroidism using **(Tool *I*)** after that, the researcher assessed mothers' practice regarding congenital hypothyrodism using **(Tool *II*)** and assessed mothers' attitude regarding congenital hypothyrodism was assessed using **(Tool *III*).**

2-Planning:

The planning phase included the nursing program time, number of sessions, teaching methods, and media used. In addition, the teaching place and the program facilities were checked for appropriateness, sessions about congenital hypothyroidism conducted at the thyroid gland clinic at Al-Mabarrah Model clinic affiliated to Health Insurance Organization at Minia governorate, the researcher conducted the study on Wednesday from (8.00 a.m. to 12.00 p.m.), divided the sample into small groups (4-5 mothers per group) 2 groups per day. The number of sessions was five sessions/group, then the researcher provided knowledge using illustrated Arabic brochure, pictures, posters, and educational videos, duration of each session is about (10-15minutes). The researcher used different teaching methods included: lectures, group discussion and booklet.

3- Implementation phase:

The content of the clinical guidelines was provided for mothers in the thyroid gland clinic, implementing the educational program covered the knowledge, attitude and practice of mothers regarding congenital hypothyroidism. The teaching sessions was provided orally for mothers as the following:

Session **I:** It included orientation for participants about the aim of study and its expected outcomes provide an introduction about the program (purpose, session's time and session's content), discussing expectations of the participants and explain definition, function, location and deficiency of thyroid gland.

Session **II:** It included meaning, causes, signs and symptoms, complications, laboratory investigations, treatment and follow up of congenital hypothyroidism.

Session **lll:** It included mothers' reported practices which included nutrition and follow-up.

Session **lV:** It included mothers' reported practices which included treatment and physical activity.

Session **V:** It included mothers' attitude which composed of 8 items related to mother's awareness regarding care of their children with congenital hypothyroidism.

The program was written into an Arabic language and was discussed in the seminar room using images, handouts, as well as videos, to facilitate training.

4-Evaluation phase

Mothers' awareness was assessed two times using the same study tools, evaluation of mother's knowledge was done using **(tool *I*)**, mothers' reported practice was evaluated using (**Tool *II***) and mother's attitude was evaluated using **(Tool *III***) to evaluate if mothers' knowledge, practice and attitude improved or not, the first assessment was done before the program sessions as a pre-test, another one was done one month after the program implementation as a post-test.

Data analysis:

The collected data were tabulated & statistically analyzed using software program and statistical package for social science (SPSS 23). The statistically analysis included percentage (%), mean, stander deviation (SD). Fisher's exact test used to detect differences between more than two variables and the sample size is small. Graphs were done for data visualization using Microsoft Excel. Correlation test and P - value of ≤ 0.05 indicates a significant result while, P value of > 0.05 indicates a non-significant result.

Results

Table (1): Bio -Demographic Characteristics of the Studied Mothers (N=50):

Bio-demographic characteristics	Studied mothers (n=50)	
	N	%
Mother's age/years:		
< 25 years	11	22
25-30 years	25	50
>30 years	14	28
Age **(mean±SD)**	**28.12±4.94**	
Occupation of mother:		
Working	16	32
Housewife	34	68
Consanguinity History of parents		
No	27	54
Yes	23	46
If yes, what is the degree?		
First degree	13	56.5
Second degree	10	43.5
Total	23	100
Received any information about congenital hypothyroidism		
No	41	
Yes	9	18
History of hypothyroidism among parents		
No	35	70
Yes	15	30
If answer is yes		
The father	1	6.7
The mother	14	93.3
Total	15	100

Table (1): Clears that; regarding age 50% of the studied mothers their ages ranged between 25-30 years old with mean± SD 28.12±4.94, 68% of them were house wives. On the other hand; 46% of mothers had history of consanguinity, 56.5% of them were first degree. In addition; 82% of mothers didn't receive any information about congenital hypothyroidism, 30% of parents had history of hypothyroidism, and mothers were found to have 93.3% of this history.

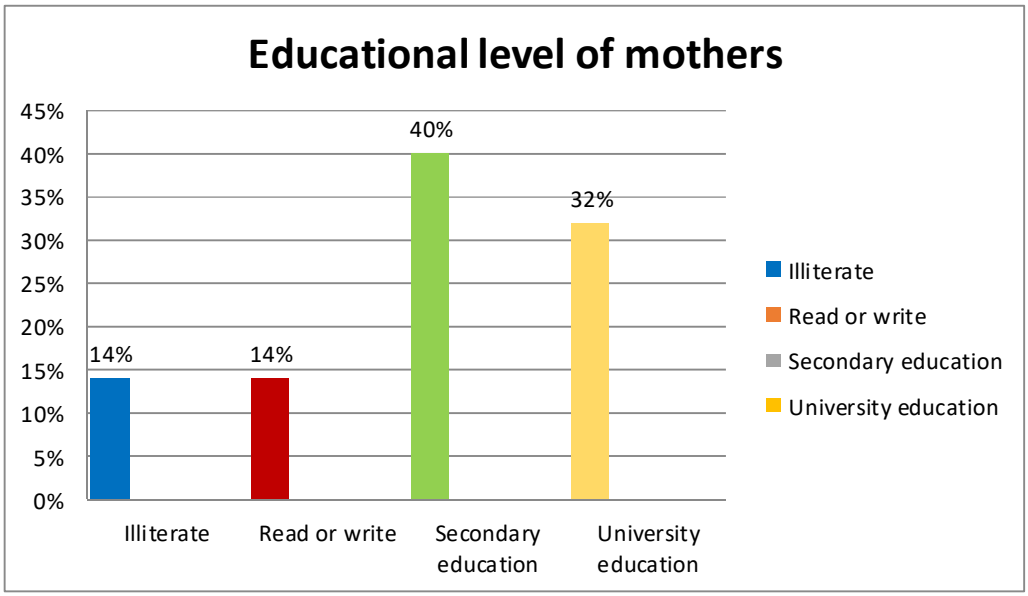

Figure (1): Percentage Distribution of the Studied Mothers According to Their Educational Level (N=50):

Figure (1): Illustrates that; 40% of the studied mothers had secondary education**.**

Table (2): Bio-Demographic Characteristics of the Studied Children (n=50):

Bio-demographic characteristics	studied children (n=50)	
	N	%
Child's age:		
Less than 1 year	25	50
1 - 3 years	22	44
4-5 years	3	6
Age (Mean ±SD)	**1.56±0.61**	
History of hypothyroidism among sibling		
No	46	92
Yes	3	6
Period that child suffering from hypothyroidism		
Less than one year	26	52
More than one year	24	48

Table (2): Clears that; 50% of the studied children had less than one year with Mean ±SD 1.56±0.61, on the other hand; 92% had no history of hypothyroidism among sibling and 52% of them suffered from hypothyroidism for less than one year.

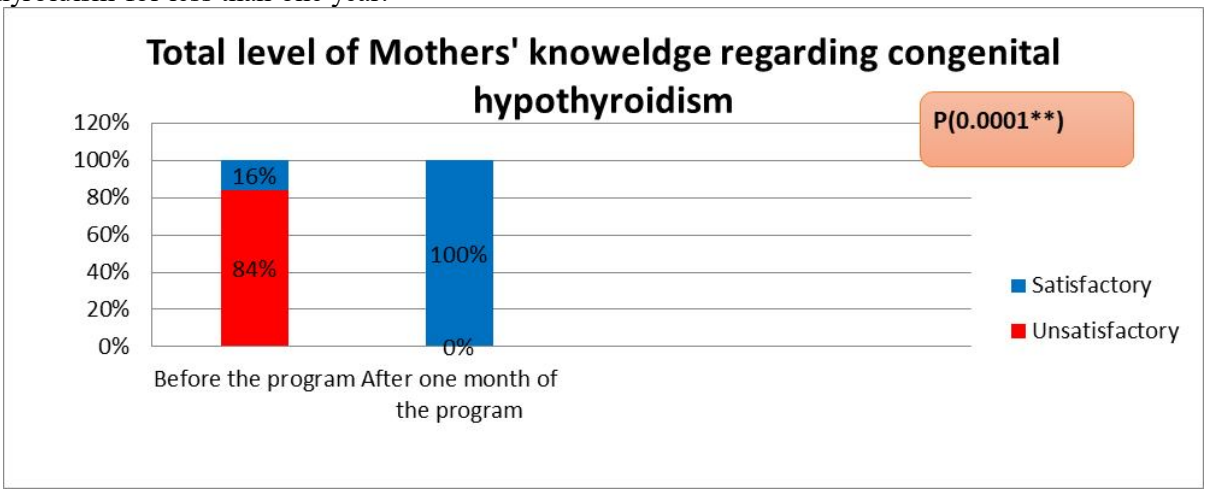

Figure (2): Percentage Distribution of the Studied Mothers According Their Total Knowledge Level Regarding Congenital Hypothyroidism (N = 50).

Figure (2): Illustrates that; 16% of the studied mothers had satisfactory level of knowledge in pre-program compared to 100% in post- program with statistically significant differences P. value at 0.0001.

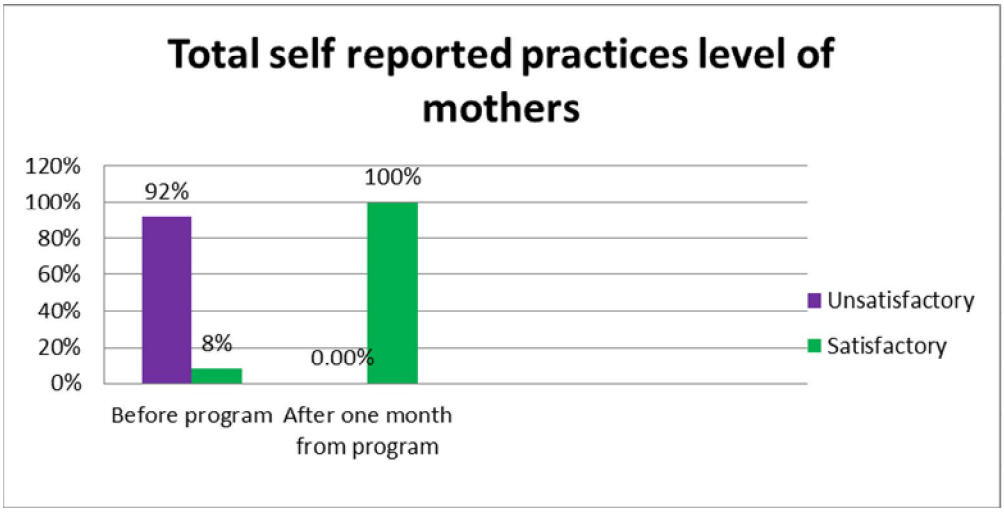

Figure (3): Percentage Distribution of the Studied Mothers According Their Mothers' Total Self-Reported Practices Level Regarding Congenital Hypothyroidism (n = 50).

Figure 3: Clears that; 8% of the studied mother had satisfactory level of self-reported practices pre-program compared to 100% of them post- program

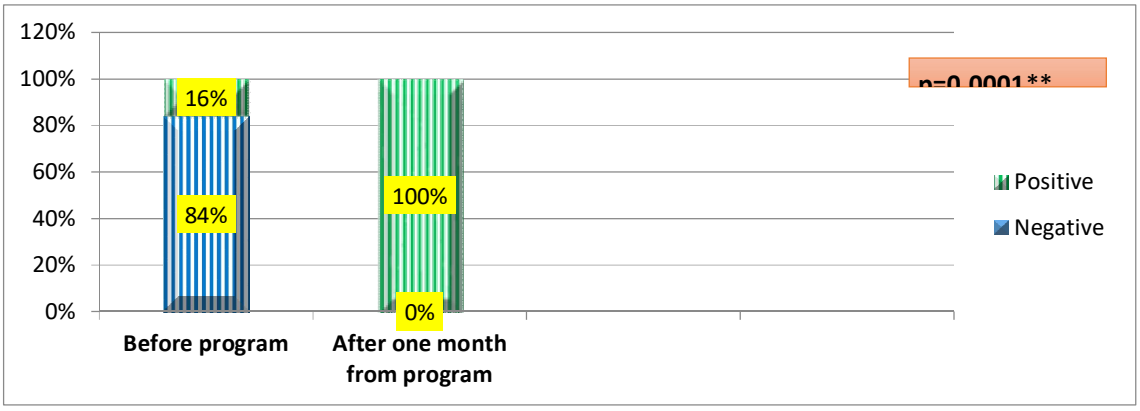

Figure (4): Percentage Distribution of the Studied Mothers According to Their Total Attitude Level Regarding Congenital Hypothyroidism (n = 50).

Figure (4): Clears that; 16% of the studied mothers had positive attitude pre-program but after the program these percentages increased to 100% post -program

Table (3): Relation between Total Knowledge Level of the Studied Mothers and their Demographic Data before the Program (n= 50).

Items	Total knowledge level before the program				Significant test	
	Unsatisfactory		Satisfactory		(X^2 or Fisher test)	P value
	No.	%	No.	%		
Mother's age/years						
< 25 years	11	100	0	0.0	2.70	0.259 (NS)
25-30 years	20	80	5	20		
>30 years	11	78.6	3	21.4		
Mother's education						
Illiterate	6	85.7	1	14.3	14.32	0.002**
Read or write	7	100	0	0.0		
Secondary education	20	100	0	0.0		
University education	9	56.2	7	43.8		

Items	Total knowledge level before the program				Significant test	
	Unsatisfactory		Satisfactory		(X^2 or Fisher test)	P value
	No.	%	No.	%		
Mother work						
Work	10	62.5	6	37.5	8.09	0.004**
House wife	32	94.1	2	5.9		

NS= Non statistical significant ** =A highly statistically significant

Table (3): proves that; there were statistically significant differences between mothers' knowledge before the program and their education and work with statistically significant differences P. value at 0.02 and 0.002 respectively.

Table (4): Relation between Total Self-Reported Practices Level of the Studied Mothers and Their Demographic Data before the Program (N= 50)

Items	Total self-reported practices level before the program				Significant test	
	Unsatisfactory		Satisfactory		(X^2 or Fisher test)	P value
	No.	%	No.	%		
Mother's age/years						
< 25 years	11	100	0	0.0	1.70	0.246 (NS)
25-30 years	23	92	2	8		
>30 years	12	85.7	2	14.3		
Mother's education						
Illiterate	7	100	0	0.0	9.23	0.02*
Read or write	7	100	0	0.0		
Secondary education	20	100	0	0.0		
University education	12	75	4	25		
Mother work						
Work	12	75	4	25	9.23	0.002**
House wife	34	100	0	0.0		

NS= Non statistical significant * =Statistical significant difference ** =A highly statistically significant

Table (4): Proves that; there were statistically significant differences between mothers' self-reported practices before the program and their education and work with statistically significant differences P. value at 0.02 and 0.002 respectively.

Table (5): Relation between Total Attitude Level of the Studied Mothers and Their Demographic Data before the Program (N= 50).

Items	Total attitude level before the program				Significant test	
	Negative		Positive		(X^2 or Fisher test)	P. value
	No.	%	No.	%		
Mother's education						
Illiterate	6	85.7	1	14.3	8.12	0.04*
Read or write	7	100	0	0.0		
Secondary education	16	80	4	20		
University education	8	50	8	50		
Mother work						
Work	10	62.5	6	37.5	8.09	0.004**
House wife	32	94.1	2	5.9		

* =Statistical significant difference ** =A highly statistically significant

Table (5): Clears that; there were statistically significant differences between mothers' attitude before the program and their education and work with statistically significant differences P. value at 0.04 and 0.004 respectively

Discussion:

Regarding to bio- demographic characteristics the studied mothers, the findings of the current study showed that, almost half of the studied mothers their ages ranged between 25-30 years. **This may be attributed to** the fact that this age range typically represents the peak childbearing years in many populations. Women within this age group are more likely to be raising young children, including those with congenital conditions such as hypothyroidism. Additionally, this age range often reflects a balance between reproductive maturity and increasing maternal responsibility, which could influence their involvement in seeking knowledge and participating in educational programs about their child's health. Current study findings were consistent with **Ez Eldeen Mahgoub *et al.*, (2021)** who assessed " mothers' knowledge and practices regarding care of their children with congenital hypothyroidism" they found that; less than two thirds of studied mothers aged 25 - 35 years. Besides, the current study finding was in agreement with the study done by **Dei-Tutu *et al.*, (2020)** who conducted a study about "Correlating maternal iodine status with neonatal thyroid function in two hospital populations in Ghana: a multicenter cross-sectional pilot study" A multicenter Cross-Sectional Pilot Study " who found that the maternal age was (25–33) years old.

Concering to occupation, the current study findings showed that; more than two thirds of them were house wives. **This finding could be explained by** the traditional family roles that are still prevalent in many communities, where women often assume the primary responsibility for child-rearing and household duties. Being a housewife may also provide mothers with more time to care for their children, especially those with chronic health conditions like congenital hypothyroidism, which requires regular monitoring and consistent care. The current study finding was consistent with the study conducted **by Tinendung *et al.*, (2021)** who assessed " the relationship of knowledge and attitude of mothers of newborn babies regarding congenital hypothyroid (shk) screening at kayu laut health center, panyabungan selatan district christmas mandiling" who reported that; more than half of mothers were housewives. Also this finding was congurent with **Hashemipou et al., (2020)** who conducted a study entitled "theassociation between familial and environmental factors and prevalence of congenital hypothyroidism in center of iran" who found that the majority of mothers were housewives.

Regardings, consanguinity history of parents, the current study findings identified that; more than half of mothers had not any history of consanguinity. These findings may reflect the gradual shift in societal awareness about the potential health risks associated with consanguineous marriages, including an increased risk of genetic disorders such as congenital hypothyroidism. Public health education and premarital screening programs in some regions may be contributing to a decline in consanguineous marriages.

Furthermore, cultural changes and increased access to information may influence couples' decisions to marry outside the extended family. However, it is important to note that The current study finding was contradicted with the study conducted by **Al Qahtani et al., (2022)** who evaluated knowledge about complication of congenital hypothyroidism among parents in aseer region, saudi arabia, they revealed that; the highest percentage of parents had history of consanguinity. Consanguinity remains a common practice in certain areas, which may still contribute to the prevalence of genetic conditions among some populations. The absence of consanguinity in a significant portion of the studied group highlights the multifactorial nature of congenital hypothyroidism, indicating that it can occur independently of hereditary factors.

Regarding previous knowledge about congenital hypothyroidism, the current study results showed that the majority of mothers didn't receive any knowledge about congenital hypothyroidism before. This lack of knowledge could be attributed to limited access to reliable health information, insufficient counseling during antenatal or postnatal care visits, and a general lack of targeted awareness campaigns focusing on congenital endocrine disorders. Current study results were congruent with the study by **Abdelmonem,et al., (2023).** who studied mother's awareness regarding their infants suffering from congenital hypothyroidism concluded that; the majority of mothers' didn't receive health education during the last pregnancy for congenital hypothyroidism and heel test analysis .Also, the present study finding was consistent with the study conducted by **Amiri *et al.*, (2019)** who assessed " prevalence of congenital hypothyroidism and some related factors in newborn infants in Southern Kerman" revealed that more than half of study participants hadn't any knowledge before about congenital hypothyroidism.

Concerning history of hypothyroidism among parents, the current study results revealed that; more than two thirds of parents hadn't any previous history of hypothyroidism. This may suggest that congenital hypothyroidism in their children may not be directly linked to hereditary factors in many cases. This finding was in the same line with the study done by **Keshavarzian et al., (2016)** who found that the majority of children have negative history of maternal congenital hypothyroidism. While this result was contradicted with **Amiri *et al.*, (2019)** reported that most of infants with congenital hypothyroidism had the disease with hereditary factors. Also this finding disagreed with **Doustmohamadian et al., (2020)** who conducted a study about " congenital hypothyroidism and its related factors in an iranian population: a retrospective study in Semnan who found that; the majority of children have a history of thyroid disease in at least one parent.

The current study revealed that; majority of children had a mother with hypothyroidism. This finding is congruent with **Dehghan et al., (2017)** who conducted a study about "permanent and transient congenital hypothyroidism and the relevant factors in infants born during 2011-2013 in Hormozgan Province" who found that more than two thirds of children had mothers with thyroid history. Also, this finding was in the same line with the study done by **Ehsani et al., (2021)** who conducted a study entitled "evaluation of the developmental outcome in children with congenital hypothyroidism" who found that less than two thirds of studied children have mothers with thyroid history. Also, the study by **Neethu et al., (2020)** about assessment of risk factors of congenital hypothyroidism and impact of patient counseling on improving knowledge, attitude and practice of the disease in post-natal mothers-a pilot study" concluded that near three quarters of newborn having the mother with hypothyroidism had the risk for the occurrence of the disease.

Regarding to educational level of studied mothers, the current study findings showed that about two fifth of the studied mothers had secondary education. The current study finding was compatible with the study conducted by **Ez Eldeen Mahgoub *et al.*, (2022)** who reported that; concerning mothers' educational qualification, the present study showed that less than half of studied mothers had middle education.

Regarding Bio-demographic characteristics of the studied children, the current study findings showed that; almost half of the studied children had less than one year. This result aligns with the fact that congenital hypothyroidism is typically diagnosed through newborn screening programs within the first few weeks of life. Early detection is critical, as prompt treatment is essential to prevent serious developmental delays and cognitive impairments. Therefore, it is expected that a significant portion of children receiving care and follow-up for this condition would be infants. The study finding was opposite to the study conducted by **Ez Eldeen Mahgoub *et al.*, (2020)** who reported that less than half of studied children aged from 1 - 3 years with .Also the study result disagreed with **Elrabie Ahmed Mohamed *et al.*, (2019)** who conducted a study about " developmental outcomes in early-treated congenital hypothyroidism: specific concern in tc99m thyroid scan role " who found that the majority of studied children was in the ages ranged between 3-7 years .

Regarding to history of hypothyroidism among sibling, the current study findings illustrated that the vast majority of study children hadn't any history of hypothyroidism among sibling. The study results were contradicted with the study by **Heidarpou , et al., (2023)** about hypothyroidism in first-degree relatives of neonates with congenital hypothyroidism: is there an association concluded that; more than two thirds of the newborn diagnosed with congenital hypothyroidism had a history of relatives' hypothyroidism

Regardings Period that the child suffering from hypothyroidism, the current study findings showed that more than half of children suffered from hypothyroidism for less than one year this may be due to almost half of studied infants had less than one year of age. This finding also was contradicted with **Brito *et al.*, (2021)** who conducted a study about" adhesion to treatment by children with congenital hypothyroidism: knowledge of caregivers in bahia state, brazil "and found that the duration of the disease was about 3 years.

Regardings total level of mothers' knowledge regarding congenital hypothyroidism, the current study findings revealed that; all mothers had satisfactory level of knowledge in post-program in the opposite less than one quarter in pre-program with statistically significant differences p. value 0.0001. The current study results were in agreement with **Radhia *et al.*, (2023)** who concluded that; after the health education program, all mothers demonstrated a satisfactory level of knowledge regarding congenital hypothyroidism. This improvement indicates the effectiveness of the

health education provided, as it significantly enhanced the mothers' understanding and attitudes towards screening for hypothyroidism in newborns. At the same line, **Neethu *et al.*, (2020)** reported that; there was a significant improvement in the knowledge, attitude, and practice of congenital hypothyroidism among postnatal mothers after counseling, with a p-value <0.001. Also, **Ez Eldeen Mahgoub *et al.*, (2022)** reported that almost three quarters of mothers had unsatisfactory knowledge about congenital hypothyroidism.

Concerning to the total self-reported practices level of mothers, current study findings showed that the minority of the studied mother had satisfactory level of self-reported practices pre-program compared to all of them post- program. these study was in an agreement with **Radhia *et al.*, (2023)** whose study have been shown to significantly improve mothers' knowledge and practices. For instance, a study demonstrated that health education led to a notable increase in mothers' understanding and attitudes towards congenital hypothyroidism screening. The present study findings were contradicted with **Ez Eldeen Mahgoub *et al.*, (2021)** whose study showed that; less than two thirds of studied mothers have adequate total practice score, and more than one third of them had inadequate total practice score. These findings consistent with **Neethu et al., (2020)** who found that; more than two thirds of mothers shown poor reported practice, while more than one third of mothers shown good reported practice. Also the study by **Abdelmonem,et al.,(2023)** Cleared that; more than half of mothers had not done practices for child with congenital hypothyroidism,while, about two fifth of them had correctly done practice.

On the other hand; these findings disagreed with **Poornima & Padmaja, (2018)** who assessed "the effectiveness of structured teaching programme on knowledge regarding prevention of iodine deficiency disorder among mother's under five children at selected Anganwadi Center, Tirupatifound", revealed that less than one third of mothers had inadequate reported practices, more than one third of them had moderate on reported practices and more than one third had adequate on reported practices.

Concerning distribution of the studied mothers according to their total attitude level regarding hypothyroidism, it was noticed that there was marked increase in the studied mothers' total attitude level regarding hypothyroidism post educational program.

This finding was similar to **Radhia *et al.*, (2023)** whose study findings found a significant improvement in postnatal mothers' knowledge, attitude, and practice regarding congenital hypothyroidism after counseling, with a notable increase in positive perceptions about screening, achieving a significant p-value <0.001, indicating the effectiveness of the educational program. Also, the current study results were in agreement with **Beegum, (2021)** his study found that the planned teaching program significantly improved mothers' knowledge and attitudes towards congenital hypothyroidism. Post-program, nearly all mothers recognized the importance of screening, even if the condition does not lead to improvement, indicating enhanced awareness.

Regarding the relation between mothers' knowledge, attitude and practices about congenital hypothyroidism and their demographic characteristics

Regarding relation between total knowledge level of the studied mothers and their demographic data before the program, the current study findings showed that there were statistically significant differences between mothers' knowledge and reported practices before the program and their education and work with statistically significant differences P. value at 0.02 and 0.004 respectively.

This finding agreed with **Hegazy et al., (2017)** who conducted a study about" socioeconomic determinants affecting compliance to therapy in patients with congenital hypothyroidism in sharkia governorate" and found that compliance to therapy was affected by the occupational and educational levels of the parents and presence of symptoms and associated congenital anomalies. Also, the current study results were in agreement with **Ez Eldeen Mahgoub *et al.*, (2021)** who reported that; the relationship between mothers' knowledge of congenital hypothyroidism and their demographic data reveals that; significant correlations, particularly with education, employment, and family income. The study indicates that higher educational levels and better economic conditions are associated with increased knowledge about congenital hypothyroidism among mothers, as evidenced by statistically significant differences in knowledge levels. Also current study results were similar to the study conducted by **Radhia *et al.*, (2023)** who concluded that mothers with higher education levels demonstrated better understanding and knowledge of congenital hypothyroidism. Additionally, educational interventions can enhance awareness

and knowledge, as shown in studies where health education significantly improved knowledge levels among mothers.

Also**, Rorin et al., (2024)** reported that there was a statistically significant differences in mothers' knowledge about congenital hypothyroidism related to their education (P=0.02), work (P=0.002), and family income (P=0.054) before the health education program, indicating demographic factors influence knowledge levels.

From the researcher's assumption, education is closely related to the mother's level of knowledge about congenital hypothyroidism screening, where it is expected that someone with higher education will have more extensive knowledge, especially about congenital hypothyroidism screening.

Regarding relation between total self-reported practices level of the studied mothers and their demographic data before the program, the findings of the study disagreed with **Machado et al., (2019)** who conducted a study entitled "influence of socioeconomic factors on the perception of cochlear-vestibular symptoms and adherence to the treatment of congenital hypothyroidism" found that socioeconomic factors did not influence treatment adherence or perceived cochlear-vestibular symptoms by caregivers of children with congenital hypothyroidism. In addition, current study findings were supported with **LaFranchi, (2019).** found that , that there was statistically significant relation between educational level ,place of residence, monthly income and mothers occupation and total reported practice of studied mothers p= 0.001.

According to relation between total attitude level of the studied mothers and their demographic data before the program, it was revealed that; there were statistically significant differences between mothers' attitude before the program and their education and work with statistically significant differences P. value at 0.04. The current study results were supported with **Abdelmonem, et al.,(2023)** revealed that; there were statistically significant relation between educational level, place of residence, monthly income and mothers occupation p= 0.001*, and total attitude of studied mothers .Also**, Radhia *et al.*, (2023)** clarified that; educated mothers are more likely to engage in health education programs, which positively influence their attitudes.

From the researcher's point of view as the mother's knowledge increased, the higher the level of correct practices in caring for their children, as well as the increase in the mother's attitudes towards their children.

Limitation of the study:

Despite the valuable insights gained from this research, certain limitation should be acknowledged . The study's sample was confined to only one sitting, which may limit the generaization of the finding to other contexts. Additionally the reliance of self-reported data for knowledge and practices introduce the possibility of bias.

Conclusion:

Based on the findings of the present study the current study findings showed that the educational program improved awareness of mothers regarding care of children with congenital hypothyroidism evidenced by increase in the satisfactory level of total knowledge as well as mothers' total reported practices and postive attitude from pre-program to post-program with statistically significant differences P. value at 0.001, in addition there were statistically significant positive correlation between total mothers knowledge, total self- reported practice and attitude before the program with statistically significant differences P. value 0.000 and 0.003 respectively. Finally, there were statistically significant positive correlation between the child's age and mothers self- reported practices P. value 0.003.

Recommendations

Based on the results and conclusion of the current study, the following recommendations were suggested:

1. Periodical educational training program for mothers at the hospital regarding care of their children with congenital hypothyroidism should be conducted.
2. Counseling services regarding detection, management and prevention of congenital hypothyroidism should be available in health care setting.
3. Developing of a guideline booklets for mothers of children with congenital hypothyroidism containing information, practices which must be implemented is essential to upgrade their knowledge about the care of children with congenital hypothyroidism
4. Pre-marital examination should be reinforced to minimize the phenomenon of marriage of relatives.
5. Further research on a large sample size and other setting is recommended.

References:

1. Abel Malek Hussein, A., Ibrahim Doma, N., A Zayed, D., Maher Mohammad Elsheikh, G., & Abd Elhady Badawy, S. (2022). Effectiveness of a screening toolkit on empowering mothers about neonatal screening tests for metabolic disorders and hearing defects. International Egyptian Journal of Nursing Sciences and Research, 3(1), 571-592.
2. Alwadani, I. M., Almohammadi, A. M., Alzamzami, W. N., & Al-zamzami, W. (2025). Prevalence of congenital hypothyroidism and efficacy of current cord sample screening in the presence of metabolic screening: A Retrospective Cohort Study. Cureus, 17(2).
3. Badawe Ahmed, E., Abd El moneem Elsayied, H., & Talaat Mohamed, A. (2024). Parents' awareness regarding newborn screening in bahariya oasis city. Egyptian Journal of Health Care, 15(2), 673-688.
4. Beegum, A. (2021). Study to Assess the Prevalence of Congenital Hypothyroidism in New Born and Assess the Effectiveness of Planned Teaching Programme Regarding Hypothyroidism Among Mothers of Neonates Delivered at Military Hospital in Jabalpur City. RGUHS Journal of Nursing Sciences, 11(3).
5. Bowden, S. A., & Goldis, M. (2023). Congenital Hypothyroidism. In StatPearls [Internet]. StatPearls Publishing. Available from: https://www.ncbi.nlm.nih.gov/books/NBK558913/
6. Braga, H., Duarte, J. L., da Cruz Fernandes, L., Salles, I. C., de Andrade, C. L. O., Ramos, H. E., & Alves, C. D. A. D. (2021). Congenital hypothyroidism as a risk factor for hearing and parents' knowledge about its impact on hearing. Journal of Otology, 16(2), 71-79.
7. Brito, L. N. S., Andrade, C. L. O. D., & Alves, C. D. A. D. (2021). Adhesion to treatment by children with congenital hypothyroidism: knowledge of caregivers in Bahia State, Brazil. Revista Paulista de Pediatria, 39.
8. Dehghan, F., Gholamipoor, Z., & Kherandish, M. (2017) permanent and transient congenital hypothyroidism (ch) and the relevant factors in infants born during 2011-13 in hormozgan province.
9. Doustmohamadian, S., Mehrizi, S., Rahbar, M. N., & Mirmohammadkhani, M. (2020). Congenital hypothyroidism and its related factors in an Iranian population: a retrospective study in Semnan (2011–2016). International Journal of Preventive Medicine, 11(1), 169.
10. Elrabie Ahmed Mohamed, M., Elsaayed, W., Ali, R., & Mohamed, M. (2019). Developmental outcomes in early-treated congenital hypothyroidism: specific concern in Tc99m thyroid scan role. Journal of Pediatric Perspectives, 7(6), 9631-9643.
11. Ez Eldeen Mahgoub Mahgoub, Z., Mohammed Adly, R., Rabie Abd Elsadik, B., & Mohammed Abd Elazez, S. (2022). Mothers' Knowledge and Practice regarding Care of their Children with Congenital Hypothyroidism. Journal of Nursing Science Benha University, 3(1), 432-444.
12. Hegazy, N. N., M Farahat, T., & A Al Shorbagy, E. (2017). Socioeconomic Determinants Affecting Compliance to therapy in Patients with Congenital Hypothyroidism in Sharkia Governorate. The Egyptian Family Medicine Journal, 1(1), 1-11.
13. Hockenberry, M. J., Wilson, D., & Rodgers, C. C. (2021). Wong's essentials of pediatric nursing-e-book. Elsevier Health 3rd., the child with endocrine dysfunction ,pp.,514-517.
14. Isaac, S., & Michael, W. B. (1995). Handbook in research and evaluation: A collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioral sciences (3rd ed.). EdITS Publishers.
15. Jones, N. H. Y., & Rose, S. R. (2024). Congenital hypothyroidism. In Pediatric Endocrinology: A Practical Clinical Guide (pp. 371-384). Cham: Springer Nature Switzerland.
16. Kurniawan, L. B. (2020). Congenital hypothyroidism: Incidence, etiology and laboratory screening. Indones J Clin Pathol Med Lab, 26(3), 375-80.
17. LaFranchi, S.H., (2021): Thyroid Function in Preterm/Low Birth Weight Infants: Impact on Diagnosis and Management of Thyroid Dysfunction. Frontiers
18. Lisco, G., De Tullio, A., Triggiani, D., Zupo, R., Giagulli, V. A., De Pergola, G., ... & Triggiani, V. (2023): Iodine deficiency and iodine prophylaxis: An Overview and Update. Nutrients, 15(4), 1004.https://www.mdpi.com/2072-6643/15/4/1004 1
19. Liu, L., He, W., Zhu, J., Deng, K., Tan, H., Xiang, L., ... & Li, X. (2023). Global prevalence of congenital hypothyroidism among neonates from 1969 to 2020: a systematic review and meta-analysis. European Journal of Pediatrics, 182(7), 2957-2965.
20. Machado, G. C., Andrade, C. L. O., Souza, I. S., Magalhães, L. P. F., & Fernandes, L. D. C. (2019). Influence of socioeconomic factors on the perception of cochlear-vestibular symptoms and adherence to the treatment of congenital hypothyroidism. Revista Brasileira de Saúde Materno Infantil, 19(2), 431-437.
21. Nagasaki, K., Minamitani, K., Nakamura, A., Kobayashi, H., Numakura, C., Itoh, M., ... & Tajima, T. (2023). Guidelines for newborn screening of congenital hypothyroidism (2021 revision). Clinical Pediatric Endocrinology, 32(1), 26-51.
22. Nazari, J., Jafari, K., Chegini, M., Maleki, A., MirShafiei, P., Alimohammadi, A., ... & Amini, S. (2021). Physical and mental growth and development in children with congenital hypothyroidism: a case–control study. Orphanet journal of rare diseases, 16(1), 1-9.
23. Oboodi, R., Fallah, B., Bahrami, R., Yazdani, N., & Hashemi, Z. (2023). The relationship between maternal hypothyroidism and the incidence of congenital hypothyroidism in infants: A Cross-Sectional Study. Journal of Nursing and Midwifery Sciences, 10(2).
24. Patil, N., Rehman, A., Anastasopoulou, C., Jialal, I., & Saathoff, A. D. (2024). Hypothyroidism (Nursing). In StatPearls. StatPearls Publishing.

Available from: https://www.ncbi.nlm.nih.gov/books/NBK568746/

25. Poornima, P., & Padmaja, A. (2018). A study to assess the effectiveness of structured teaching programme on knowledge regarding prevention of iodine deficiency disorder among mother's under five children at selected Anganwadi Center, Tirupati. IOSR J Nurs Health Sci, 7, 84-9.
26. Radhia, M. Z., Asmawati, D., & Rahmawati, I. (2023). Pengaruh Pendidikan Kesehatan terhadap Pengetahuan dan Sikap Ibu Hamil tentang Skrining Hipotiroid Bayi Baru Lahir di Wilayah Kerja Puskesmas Kawal. Journal on Education, 6(1), 3431-3440.
27. Ragab, F. E. S., Al Sharkawi, S. S., & Ismail, S. S. (2020). Nurses' performance about screening test of congenital hypothyroidism among newborn infants. Egyptian Journal of Health Care, 11(3), 208-220.
28. Ramadan E.N., Abd Elaal E.M., khalaf S.M., and Saied K.M., (2014). Effect of Health Educational Program on Mothers' Perception and Practices Regarding Care of their Children with Congenital Hypothyroidism, available at: https://www.bu.edu.eg/portal/uploads/Nursing/.
29. Rivkees, S. A., & Bauer, A. J. (2019). Thyroid disorders: manifestations, evaluation, and management in children and adolescents. Contemp. Ped.
30. Rorin, U., Wanawati, I., Febriani, U. S., Windayanti, H., & Salafas, E. (2024). Pendidikan Kesehatan Skrining Hipotiroid Kongenital (SHK) bagi Ibu Nifas di RS PKU Muhammadiyah Temanggung. INDONESIAN JOURNAL OF COMMUNITY EMPOWERMENT (IJCE), 6(2), 147-151
31. Rose, S. R., Wassner, A. J., Wintergerst, K. A., Yayah-Jones, N. H., Hopkin, R. J., Chuang, J., ... & Spire, P. (2023). Congenital hypothyroidism: screening and management. Pediatrics, 151(1), Article e2022060419. https://doi.org/10.1542/peds.2022-060419
32. Stoupa, A., Kariyawasam, D., Nguyen Quoc, A., Polak, M., & Carré, A. (2022). Approach to the patient with congenital hypothyroidism. The Journal of Clinical Endocrinology & Metabolism, 107(12), 3418-3427.
33. venugopalan L., Rajan A., Prasad H.K., Sankaran A., Gnanabalan Murugesan G., and Ramanathan S.,(2021). Impact of maternal thyroid disease on neonatal thyroid status. Journal of Pediatric Endocrinology and Metabolism, vol. 34, no. 2, pp. 237-241, available at: https://doi.org/10.1515/jpem2021- 0349
34. Venugopalan, L., Rajan, A., Prasad, H. K., Sankaran, A., Murugesan, G., & Ramanathan, S. (2021). Impact of maternal thyroid disease on neonatal thyroid status. Journal of Pediatric Endocrinology and Metabolism, 34(2), 237-241