

Nurses' Performance about Screening Test Of Congenital Hypothyroidism Among Newborn Infants

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Abstract

Background: Congenital Hypothyroidism is a major health problem in newborns as it's one of the most common causes of mental retardations. Nurses are the key member in helping the children with Congenital Hypothyroidism. Nurses have many important roles in maternal and child health centers such as awareness, health educator and health care provider. **This study aimed to:** assess the nurses' performance about screening test of Congenital Hypothyroidism among Newborn Infants. **Setting:** This study was conducted at the maternal and child health care centers in Helwan City. **Design:** An exploratory described design was utilized for conducting the study. **Sample:** A systemic random sample of 110 nurses included in the study working at the previously mentioned settings. **Tools:** The first tool is a predesigned questionnaire sheet to assess nurses' knowledge about Congenital Hypothyroidism, The second tool is observational checklist to assess nurses' performance for screening test of Congenital Hypothyroidism. **Results:** revealed that, the mean age of the studied nurses was 27.5 ± 4.8 years. Also, it was clear that there was poor level of nurses' knowledge and level of practice about screening test of congenital hypothyroidism. **Conclusion:** In the light of present study findings, the studied nurses had deficit knowledge and poor performance level related to the screening test of congenital hypothyroidism. **Recommendation:** This study recommended that, Nurses should be provided continuous educational program in order to improve their knowledge and practice with continuous supervision and guidance of nurses' performance to achieve and maintain the quality of care.

Keyword: Newborn, Congenital Hypothyroidism, Mental Retardations.

Introduction

Congenital hypothyroidism (CHT), is a condition of thyroid hormone deficiency present at birth. Approximately 1-4000 newborn infants has a severe deficiency of thyroid function, while even more have mild or partial degree. If CHT untreated for several months after birth, severe congenital hypothyroidism can lead to growth failure and permanent retardation (Mittage et al, 2015).

Also, congenital hypothyroidism (CHT) known as cretinism, usually results from failure of the thyroid gland to migrate during fetal development. These

results in malformation of the thyroid gland, which leads to insufficient production of the thyroid hormones that are required to meet the body's metabolic, growth and development needs. Congenital hypothyroidism leads to low concentrations of circulating thyroid hormones tri-iodothyronine (T3) and thyroxine (T4) (Kyle and Carman, 2013).

Congenital hypothyroidism affects in approximately 1 to 4000 live births and is caused by dysgenesis (agenesis, aplasia, ectopic) or, less often, dyshormonogenesis (enzyme defects).

Dyshormonogenesis, disorders of intra-thyroid metabolism, or goitrous

congenital hypothyroidism occurs in about 1 in 30, 000 live births (**Marcdant and Kliegman, 2015**).

Iodine deficiency is the leading preventable cause of mental retardation worldwide. Iodine is essential for the production of thyroid hormones, for normal growth and for brain development in chronic severe iodine deficiency, thyroid hormone synthesis is reduced (**Mohamed, 2013**).

The infant with hypothyroidism has a prolonged newborn jaundice, poor feeding and constipation, cool, mottled skin, increased sleepiness, large fontanelles, and a large tongue. Older children or teens have short stature with delayed eruption of teeth, dry skin and brittle hair, cold intolerance, constipation, facial puffiness, and muscle aches and pains. The heart rate is slow, and reflexes are delayed. There are delays in major developmental milestones, mental deficiencies, sluggishness, or lethargy (**Ward, 2014**).

Newborn screening is recognized as one of the most successful recent pediatric health accomplishments. Serum levels of T4 or free T4 are low; serum levels of T3 may be normal and are not helpful in the diagnosis. If the defect is primarily in the thyroid, levels of TSH are elevated, often to >100 mU/L. Serum levels of thyroglobulin are usually low in infants with thyroid agenesis or defects of thyroglobulin synthesis or secretion, whereas they are elevated with ectopic glands and other inborn errors of T4 synthesis, but there is a wide overlap of ranges (**Kliegman et al., 2016**).

Mental retardation and other complication can be prevented by early diagnoses and treatment, newborn infants with congenital hypothyroidism should begin therapeutic management, which

consists of a lifelong thyroid hormone replacement usually in the form of levothyroxine which is administered as a single dose that varies with age. Moreover vitamin D supplement may also be given to prevent the development of rickets (**Lafranshi, 2011**).

Congenital Hypothyroidism (CHT) is one of the most common preventable causes of mental retardation with worldwide incidence of 1:4000 live births. Ideally universal screening at 3:4 days of age should be done for detecting CHT. Abnormal values on screening should be confirmed by a venous sample before initiate the treatment. Terms as well as preterm newborn with low T4 and elevated Thyroid Stimulating Hormone (TSH) should be started on L-Thyroxine at day as soon as the diagnosis is made. Regular monitoring should be done to ensure that T4 is in normal range. The outcome of CHT depends on the time of initiation of therapy and the dose of L-Thyroxine used with the best outcome in newborn infants started on treatment before two weeks of age (**Agarwal, 2015**).

Nurses serve as the front line in assuring that all newborn infants receive Congenital Hypothyroidism (CHT) screening and must remain alert to sign indicative of possible hypothyroidism. 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. Nurses should be provide the family information about benefits and harms of congenital hypothyroidism tests and the infant should be tested during 2-4 days after birth and in 48 hours before discharge (**Greenberg, 2014**).

Significance of the study

Congenital hypothyroidism is a major health problem in newborns as it is one of the most common causes of mental retardation. The prevalence of congenital hypothyroidism based on nationwide programs for neonatal screening was initially reported at 1 in 4, 000 infants worldwide. The prevalence in Egypt is about 1: 2500 newborn infants (El-Dakhakhny, et al. 2011).

Nurses are the key member in helping the children with congenital hypothyroidism. The nurses have many important roles in Maternal and Child Health centers such as awareness, health educator and health care provider (vaccination, growth measurements and screening test for congenital hypothyroidism). From the researcher's point of view, lack of knowledge and practice about screening test of congenital hypothyroidism can lead to increased incidence of complication. So that special studies should be carried out nurses' knowledge and identify their practices regarding congenital hypothyroidism in order to determine the gaps, defects and work necessary to overcome those defects.

Aim of the Study

This study aims to assess the nurses' performance about screening test of congenital hypothyroidism among newborn infants.

Research Questions

The present study will intend to answer the following questions:

- What is the nurses' knowledge about screening test of congenital hypothyroidism among newborn infants?

- What are the nurses' levels of practice about screening test of congenital hypothyroidism among newborn infants?

- Are there relations between nurses' knowledge and practice and their characteristics?

Subjects and methods

Research Design:

A descriptive design was utilized for conducting this study.

Research Setting:

This study was conducted in the Maternal and Child Health Centers (MCH) in Helwan City .The study was conducted at 8 centers selected by using a systemic random sample technique as the following (Elmasaraa, Elhadek, Elst-khadra, Elmsakan, ReayaAwal, ReayaTany, Elain, and Elrkna).

Research Subjects:

All available nurses in the previously mentioned settings were included in the study sample (110 nurses). Newborn infants between 3: 7 days old are included in the study.

Tools of Data Collection:

Two tools were utilized in data collection:

Tool I: Predesigned questionnaire sheet:

Part 1: Characteristics of studied nurses as age, gender, marital status, qualification, educational level and years of experience.

Part 2: Assessment of nurses' knowledge regarding to congenital

hypothyroidism as definition, causes, diagnosis, types, complications, treatment and role of the nurse.

Part 3: Newborn assessment (length, weight, age, gender, gestational age, current diseases and any congenital anomaly).

Tool II: Observational checklist:

This tool was revised by supervisors after reviewing the related literature and revised by supervisor. It was used to assess nurses' practices toward application of screening test; it included nurses' practice before, during, and after the procedure regarding newborn thyroid screening test is heel puncture should be done on the most media or lateral portion of the plantar surface of the heel.

Operational Design:

The operational design for this study includes preparatory phase, content validity, pilot study and field work.

Preparatory Phase:

It included reviewing past, current, local and international related literature and theoretical knowledge of the various aspect of the study using books, articles, journals, internet and scientific periodicals magazines to develop tools for data collection and to get acquainted with the various study aspect of the research problem.

Content Validity:

The revision of tools for clarity, relevance, comprehensive, understanding and applicability were done by three experts in the field of pediatric nursing to assess the content validity of the tools and

the necessary modification were done accordingly.

Pilot Study:

The pilot study carried out from May, 2017 included 10% of the total subjects (n=110) to test the applicability, clarity and efficiency of the tools and then the necessary modifications of the tools were done according to the result of pilot study. Therefore, the sample of pilot study was included in total study nurses.

Field Work:

The actual field work started end of June, (2017) and extended to November, (2017) for data collection each nurse was interviewed and assessed individually using the study tools. The researcher was available at each study setting by rotation, 2 days weekly (Saturday and Tuesday) throughout the morning shift from 9 A.m. to 2 P.m. The researcher introduced herself to the nurses then informing them about the purpose of study. Questionnaire take 10-15 minutes. As regards the nurses' practices, they were observed in previously mentioned settings during their actual work in the shift. Time consumed for assessing the procedures take 10-20 minutes according to check list.

Administrative Design:

An official permission to carry out the study was obtained from the Dean of the Faculty of Nursing at Helwan University to the directors of maternal and child health center (MCH) centers that previously mentioned setting to take permission to conduct this study. The researcher assured that information obtained was confidential and to be used only for purpose of the study. A consent was obtained orally from nurses ensuring complete privacy and total confidentiality.

Ethical Consideration:

Approval of the study protocol was obtained from Ethical Committee in the Faculty of Nursing at Helwan University before starting the study. The researcher clarified the objective and aim of the study to the nurses included in the study. Each study nurse was secured that all gathered data was used for research purpose only. The study sample was informed about the purpose and expected outcome of the study and they were assured that the study is harmless, their participation was voluntary and they had the right to withdraw from the study at any time without giving any reason. They were assured also that anonymity and

confidentiality of the obtained data was guaranteed.

Statistical Design:

The data were collected, revised, coded, organized, categorized, tabulated and analyzed using frequencies, percentage, mean scores, and standard deviation. Chi-square test, r test and P-value were used to estimate the spastically significant differences between the study variables. Data were presented in form of tables & Figures. Quantitative data was presented by mean and standard deviation (SD). Qualitative data was presented in form of frequency, distribution tables, numbers and percent calculations.

Results**Part I: Characteristics of the studied nurses and newborn.**

Table (1): Number and percentage distribution of the studied nurses according to their characteristics (n=110).

Nurses characteristics	No	%
Age (in years)		
≤ 20	31	28.2
20 < 30	25	22.7
30 < 40	22	20.0
≥ 40	32	29.1
Mean ± SD	27.5 ± 4.8	
Gender		
Female	110	100.0
Educational level		
Nursing diploma	61	55.46
Specialization diploma	30	27.27
Bachelor of nursing	19	17.27
Marital status		
Married	70	63.6
Single	12	10.9
Divorced	28	25.5
Years of experience in hypothyroidism unit		
≤ 1	22	20
1 < 5	23	20.9
5 < 10	21	19.1
≥ 10	44	40
Mean ± SD	27.5 ± 11.03	

Table (1): showed that, the mean ages of studied nurses were 27.5 ± 4.8 years, all of them were female, more than half of them (55.46%) had nursing diploma, about two thirds of them (63.6%) were married, it was clear from this table that, the mean years of experience of studied nurses were $27.5 \pm 11.3\%$.

Figure (1): Percentage distribution of studied nurses about training of screening test about congenital hypothyroidism among newborn infants.

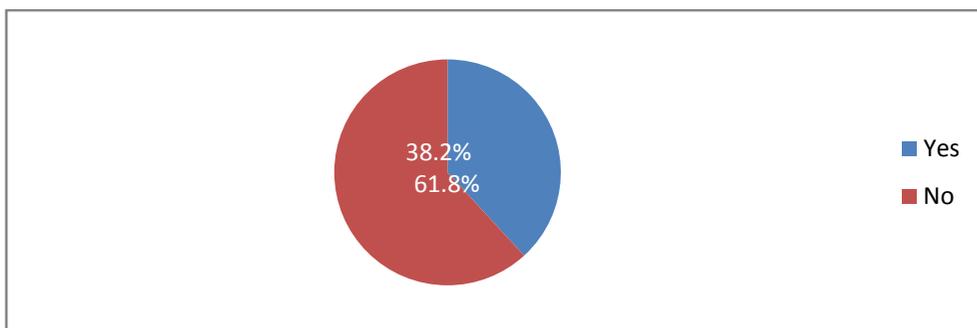


Figure (1): it clarified that, about two thirds of them (61.8%) didn't have any training about screening test of congenital hypothyroidism among newborn infants.

Table (2): Number and percentage distribution of the studied nurses according to their total level of knowledge about congenital hypothyroidism (n=110)

Total nurses' knowledge	No	%
Satisfactory	25	22.7
Average	10	9.1
Poor	75	68.2

Table (2) showed that, more than two third of the studied nurses (68.2%) had poor level of knowledge about Thyroid hormone and screening test.

Figure (2): Percentage distribution of studied nurses according to their total level of practice

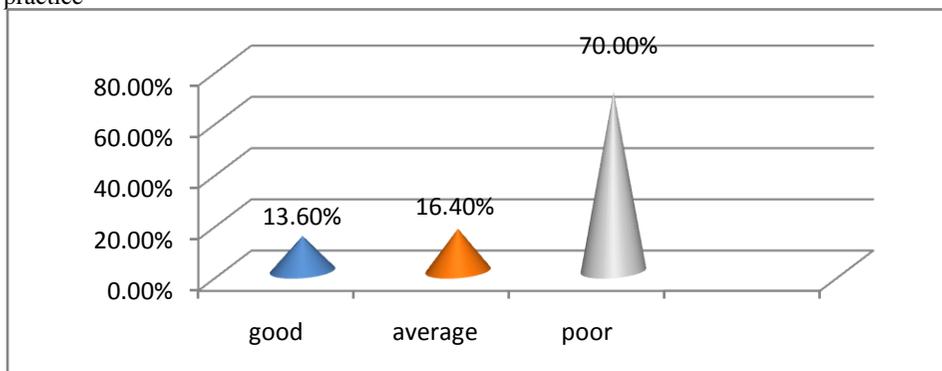


Figure (2) showed that about three quarters of the studied nurses (70.00%) had poor practice regarding new born thyroid screening test.

Table (3): Relation between nurses' practice and their characteristics.

	satisfactory		average		poor		X ²	P-Value	
	No.	%	No.	%	No	%			
Age: (years)									
≤ 20	8	16.6	5	18.5	18	51.4	22.07	0.001*	
20 < 30	9	18.8	6	22.2	10	28.6			
30 < 40	10	20.8	7	26	5	14.3			
≥ 40	21	43.8	9	33.3	2	5.7			
Educational level									
Nursing diploma	13	27.1	17	62.9	31	88.6	32.8	0.00001*	
Specialization diploma	20	41.7	7	26	3	8.6			
Bachelor of nursing	15	31.2	3	11.1	1	2.8			
Years of experience in Hypothyroidism unit:									
≤ 1	3	6.3	3	11.1	16	45.7	43.5	0.0001*	
1 < 5	4	8.3	7	26	12	34.3			
5 < 10	11	22.9	9	33.3	1	2.8			
≥ 10	30	62.5	8	29.6	6	17.2			
Training about Congenital Hypothyroidism among Newborn Infants									
Yes	42	34	70.8	4	14.8	4	11.4	38.5	0.00001*
No	68	14	29.2	23	85.2	31	88.6		

(*) statistically significance, (P) < 0.01.

Table (3) showed that there was statistically significant difference (P < 0.01) between nurses' practice as regards age, educational level, years of experience and training about congenital hypothyroidism, where the nurses in young age, had low level of education, low experience in hypothyroidism unit and didn't receive training about congenital hypothyroidism were having poor level of practice was statistically significant difference (X² = 22.07, 32.8, 43.4 and 38.5 at P = 0.001, 0.00001, 0.0001 and 0.00001 respectively).

Table (4): Correlation between total knowledge and total practice of studied nurses.

Items	Total level of practice	
	r test	P value
Total level of knowledge	0.69	0.013*

(*) statistically significance, (P) > 0.01.

Table (4) showed that there was statistically significant difference and positive correlation between total level of knowledge and total level of practice (r = 0.69, p = 0.013).

Discussion

According to characteristics of studied nurses the present study revealed that, the mean age of nurses was 27.5 ±

48 years. This finding was agreement with **Hussein (2014)**, in a study entitled (Assessment of Nurses Knowledge and

Performance about Newborn Screening Test of Congenital Hypothyroidism in Assiut City), who found that 56.7% of nurses age were ranging from 30 – 40 years with mean \pm SD 30.3 ± 9.4 years.

In addition, all of nurses were female and more than half of studied nurses had nursing diploma. As regard years of experience it was noticed that more than one third of them had 10 years of experience in Maternal and child health center, this finding was agreement with **Hussein (2014)**, who found that 100% of studied nurses were female, 58% of them had nursing diploma and 38% of them had 10 years of experience in MCH.

Regarding the pervious training courses that the nurses attended about congenital hypothyroidism, it was showed that two third of the studied nurse didn't attend any training courses related to thyroid screening test. This finding was in agreement with **Shehata (2015)**, in a study entitled (Assessment of Nurses' Performance about Screening Test of Congenital Hypothyroidism), who reported that 66% of nurses hadn't attended any training courses. From the researcher point of view, this result may be due to that the majority of nurses had nursing diploma and were not aware about training course.

Most neonates born with congenital hypothyroidism have normal appearance and no detectable physical signs. Hypothyroidism in the newborn period is always overlooked. So, the nurse had a great role toward assessing those neonates. The present study revealed that only 8.3% of nurses know clinical manifestation of Congenital Hypothyroidism (CH) in both infants and older children.

As regard the nurses' practice according to their observational checklist

about newborn thyroid screening test, the current study revealed that, about half of the studied nurses didn't explain the procedure the infants' parents and perform hand washing after the procedure, more than half of them (56.4%) didn't perform the heeling puncture correctly. These findings were in agreement with **Hussein (2014)**, who found that 45% of the studied samples didn't perform aseptic technique after the procedure and heeling puncture correctly.

As regard the relation to the total scores of nurses' knowledge regarding their characteristics, the current study found that, there was a highly statistically significant difference ($P < 0.01$) between nurses' knowledge and both educational level and pervious training courses about congenital hypothyroidism. This findings were in agreement with **Abolwafa (2015)**, who indicated that total score of nurses' knowledge and practice were higher than those who didn't attend to the course about congenital hypothyroidism. In study about effects of transient neonatal with hypothyroidism on intellectual quotient and psychomotor performance. This findings were in disagreement with **Helmy (2013)**, in study titled (Congenital Hypothyroidism and Implication for Investigators and Clinicians), who found that high statistically difference between nurses' knowledge and their characteristics.

The current study found that, there was a highly statistically significant difference ($P < 0.01$) between nurses' practices as regards age, educational level, years of experience and pervious training courses about Congenital Hypothyroidism. This finding were in agreement with **Mohamed (2013)**, who found that highly statistically difference between practice and attending to pervious training program about Congenital Hypothyroidism. Additionally

this study was in agreement with **Mahmoud (2014)**, who found that highly statistically difference between the practices and pervious training courses in study about quality assurance in the newborn screening in laboratory methods.

The present study revealed that, there was a highly significant statistically significant difference ($P < 0.01$) between total nurses' knowledge and nurses' practices. This findings were in agreement with **Shahin (2012)**, in study titled (Risk Factors for Congenital Hypothyroidism: result of a Population Case-Control Study), who found that there was a positive correlation between total score knowledge and total score practice. Additionally, these findings were in agreement with **Ibrahim (2016)**, in study titled (Nurses' Knowledge and Practice about Congenital Hypothyroidism Screening in Neonates), who found that there was positive correlation between total knowledge and total practice of studied nurses.

Conclusion

Based on the study findings, it can be concluded that, about two third of the studied nurses had poor level of knowledge about thyroid hormone and screening test, also about three quarters of them had poor practices regarding newborn thyroid screening test. There was a positive correlation between the total score knowledge and total score of practice. There was highly statistically significant difference between the studied nurses' level of knowledge and their educational level and attending pervious training course about congenital hypothyroidism, also there was highly statistically difference between studied nurses' level of practice and their age, educational levels, years of experience and attending pervious training about congenital hypothyroidism.

Recommendations

In the light of the study findings, the following recommendations are suggested:

- A periodical educational program for nurses is necessary to improve nurses' performance about screening test of congenital hypothyroidism.
- Counseling services regarding detection, management and prevention of congenital hypothyroidism should be available in health care setting.
- Dissemination of a procedure book based on evidence-based practice containing all nursing activities related to screening test of congenital hypothyroidism among newborn infants.
- Further studies should be conducted to improve nurses' awareness regarding evidence-based practice for the screening test of congenital hypothyroidism among newborn infants.

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Conflict of interest

No.

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