

## Impact of an Educational Program on Nursing Care of Neonates with Congenital Hypothyroidism

Amal Mohamed El-Dakhkhny

Pediatric Nursing Dept., Faculty of Nursing, Zagazig University, Zagazig, Egypt.

[dr\\_amal2001@yahoo.com](mailto:dr_amal2001@yahoo.com)

**Abstract:** Background: Unrecognized congenital hypothyroidism (CH) leads to mental retardation. Newborn screening and thyroid therapy started within two weeks of age and effective nursing intervention can normalize cognitive development. Initial dosage of 10 to 15 µg/kg Levothyroxine is recommended.

Objectives: this study aims to assess nurses' knowledge regarding CH, to evaluate nurses' intervention offered to CH neonates and to determine the impact of educational program on nurses' performance regarding care of CH neonates.

Design: A quasi experimental design was used in this study. Subjects and Methods: This study included 60 nurses whom were recruited from 3 maternal and child health units (MCH) at Zagazig city. Two tools were used to collect the necessary data: a structured interview sheet and observational checklist were used to assess nurses' performance.

Results: It was found that total nurses' complete knowledge and practice score about hypothyroidism was poor (100%) before program implementation and improved at post- test and this results was highly significant at 1%.

Conclusion: The nurses' performance significantly improved after program implementation.

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**Key wards:** Congenital Hypothyroidism

### 1. Introduction:

Thyroid hormone is essential for normal brain development. Newborn who are born with congenital hypothyroidism (CH) and lacking for thyroid hormone during a circumscribed period of early development will be at risk of brain damage and mental retardation<sup>(1,2)</sup>.

Congenital hypothyroidism is the most prevalent endocrine disorder in the newborn and affects 1 in 3000 newborns.<sup>(3)</sup>, while it was 1-1300 in Bangladesh<sup>(4)</sup> and 1:370 neonates in Iran<sup>(5)</sup> Screening for CH is a major achievement of pediatricians because early diagnosis and treatment have resulted in normal development in early all cases<sup>(6)</sup>.

The thyroid gland is responsible for controlling the rate of metabolism in the body through production of Thyroxine (T4) and triiodothyroxine (T3). If there are any defect in the thyroid gland it will lead to insufficient production of thyroid hormone (T3&T4) to meet the body metabolic needs which leads to physical and mental retardation if not start the treatment during or in the first month after delivery<sup>(7,8)</sup>.

Congenital hypothyroidism is caused by an absent or under developed thyroid gland. Other causes may be hypothalamic or hypopituitary disorder in which there is insufficient thyroid stimulating hormone to stimulate the thyroid gland. In addition maternal intake of medications during pregnancy or exposure to radiation can cause

transient or permanent hypothyroidism in the neonates<sup>(2,9)</sup>.

Many researches suggested that the incidence of CH is expected to be elevated in the zone of moderate iodine deficient areas and parental consanguinity<sup>(10)</sup>.

The neonates with CH present with cold extremities and hypothermia as well as slow pulse and respiratory rate. Neonates might have respiratory difficulty and prolonged jaundice<sup>(9,11)</sup>. In addition the CH neonates present with improper neurodevelopment mental state such as weak reflexes and poor behavioral and orientational responses<sup>(12,13)</sup>.

Congenital hypothyroidism is usually diagnosed by neonates' thyroid screening and serological testing for T3&T4 which are low (below 5ug/dl) and increased thyroid stimulating hormone (TSH) above 6 uu/ml<sup>(7,8)</sup>.

Therapeutic management of CH consists of lifelong thyroid hormone replacement usually in the form of levothyroxine; it is given as a single dose that varies with age.<sup>(14-16)</sup> moreover vitamin D supplement may also be given to prevent the development of rickets<sup>(1,2)</sup>.

Nurses have a major role in caring for CH neonates such as assessing growth and development and ensuring compliance of mothers with medication. Nurses should instruct mothers how to count their neonates, pulse. She should also instruct

mothers regarding the signs and symptoms of hyperthyroidism (increase sweating, increase heart rate, diarrhea, loss of weight, increase body temperature and irritability) and signs of hypothyroidism (decreased heart rate, constipation, weight gain and hypothermia<sup>(9)</sup>).

In addition, nurses should instruct parents about regular periodic measurement of thyroxine levels and follow up to ensure normal physical and mental development<sup>(9,17)</sup>.

So, establishing of an educational program for pediatric nurses is essential for their education and development, because the program would move nursing forward in the most effective way possible to improve their nursing intervention.

The aim of this study was to improve nurses' care of CH neonates.

The aim of the study was to:

Assess nurses' knowledge regarding congenital hypothyroidism, evaluate nurses' intervention offered to CH neonates, and to determine the impact of educational program on nursing care of neonates with CH.

## 2. Subjects and Methods

### I- Research Design

A quasi experimental design was used in the present study.

### II- Setting:

This study was conducted at three MCH at Zagazig city. On MCH from each sector of the city, which were chosen according to the highest number of nurses working at it and also the highest number of attendancy in it.

### III- Subjects:

All nurses (60nurse) working in the above three mentioned setting were comprise the sample, 20 nurses from each one.

### IV- Tools:

Two tools were developed by the researcher to collect the necessary data:

Tool I: A structured questionnaire interview sheet for nurses which include the following parts:

Part A: Biosocial characteristics of nurses such as age, qualification, years of experience and any previous educational program attended about CH.

Neurological & and behavioral assessment. Moreover, nurses' role regarding these neonates.

Scoring system of nurses' knowledge was developed by the researcher.

The total grad of knowledge equal 114 grads, each correct answer took 2 grads, while wrong one took zero.

The points were classified as following:

- Definition of CH took 2 grads
- Causes of CH took 14 grads
- Manifestations of neonates took 20 grads
- Manifestations of infancy took 22 grads
- Signs of over dose took 10 grads
- Signs of under dose took 8 grads
- Diagnosis of CH took 4 grads
- Treatment of CH took 2 grads
- Nurses' role of CH took 32 grads

The total knowledge score was classified as:

- Poor < 50% equal less than 57 grads.
- Fair 50 – 74% equal 57 –
- Good 75% & more equal 85 –

Tool II: Observational checklist was developed to evaluate nurses' intervention offered to CH neonates, it includes anthropometric measures, and vital signs.

Assessment of neonatal reflexes as well as behavioral and orientation responses which were adopted from Brazelton behavioral assessment scale was recorded. Moreover, health instructions which should be given to mothers was also recorded:

Scoring system of nurses' intervention was developed by the researcher.

The total grad of performance was 48 grades, each item done scored 2 grades and zero if not done.

The total score was classified as:

- Poor <50% equal less than 24 grads
- Fair 50-74% equal 24 –
- Good 75 % & more equal 36 –

### Program development

Educational program was developed by the researcher that aimed to improve nurses' performance offered to CH neonates.

The program was applied in three sessions for nurses of each MCH.

- The first session took one hour and it include the assessment phase and the pre test using tool I and each nurse was observed separately using tool II.
- Second session was the program implementation and it took one hour. Various teaching methods were used as lectures, group discussion, demonstration on normal neonates & CH neonates & redemonstration were done. It includes complete information

about CH and post I test was done using tool I part B & tool II.

- Third session took 20 minutes. It was done after three months of program implementation using the same tools.

Evaluation of the educational program's success was based on the improvement of nurses' performance. And this evaluation was done before the program and immediately after the program and then after 3 months.

## II- Methods

- Approval for data collection was obtained from the board of ministry of health.
- The tools were developed by the researcher based on reviewing literature.
- Jury was done to the tools by five experts (three professors of pediatric nursing, one professor of endocrinology, and one professor of statistics).
- All nurses were acquainted with the aims of the study.
- A pilot study was done on 5 nurses to test clarity and practicability of the tool, necessary modification was done
- Pre test was done for nurses of each MCH using tool I.
- Each nurse was observed separately to complete the observational checklist using tool II.
- The program was given and post I test was done immediately after the program implementation and also reassessment was done after 3 months by using the same tool.
- Data was collected over a period of 6 months starting from January to June 2009.

## Data analysis

The collected data were revised, coded and fed to a fox pro program data base. Data was then transferred to SPSS version 13 program for statistical analysis which included frequency, percentages, cross tabulation, mean, standard deviation, chi square and one way analysis of variance(ANOVA). The level of significant used was at  $P \leq 0.01$ .

## 3. Results

Regarding to biosocial characteristics of the studied nurses, it was found that the mean age of nurses was 28.05 years.

As regard to education, it was found that 80% of nurses had complete secondary nurses school, while 20% of them finished technical nursing education.

It was found also that 48.30% of studied nurses had 5.9 years of experience with mean 8.30 years. In addition 83.33% of studied nurses did not attend any previous educational program about congenital hypothyroidism.

Concerning to sources of nurses' knowledge about CH, it was found that 83.33% of them had gain their knowledge from the present educational program.

Nurses' complete knowledge about CH was illustrated in table I. It was found that 1.7% only of nurses had complete answers before program implementation about CH definition and this percentage increased to 98.3% at post I and slightly decreased to 68.3% at post II and the result was statistically significant.

Inborn error of thyroid hormone and prenatal iodine deficiency were mentioned by nurses as a cause of CH before implementing the program (46.7% & 20% respectively), while some other causes of CH were reported by nurses at post I such as maternal intake of goiterogens (100%), geographic iodine deficiency (96.7%), agenesis of thyroid (90%) as well as Hypoplasia (78.3%) and Ectopic thyroid (70%).

Regarding to neonatal manifestations, it was found also at table I that nurses' knowledge was deficit before program implementation. On the other hand all nurses at post I reported increased birth weight, hypothermia, cold dry skin, poor feeding as well as hypotonia and constipation followed by prolonged physiological jaundice, abdominal distention and wide anterior fontanel (98.3% for each) as a neonates' manifestations.

Regarding to nurses' complete knowledge about infant's manifestations, it was found that no one of nurses knew the functional changes before program implementation except only 1.7% knew hypotonia. On the other hand all nurses at post I mentioned that diminish intestinal activity, hypotonia, abdominal distention as well as dry skin and physical changes were the functional changes among infant with CH.

Stunted height, over weight and delayed dental development were mentioned by all nurses at post I as a retardation of G&D compared to none before implementation of program the result was statistically significant between nurses' knowledge before the program and at post I and post II.

The result of nurses' knowledge was statistically significant between their knowledge before program implementation and at post I and post II.

Nurses' complete knowledge about signs of over and under dose was shown in table II. It was found that increase heart rate, diarrhea and loss of

weight were mentioned by 100% of nurses as a signs of over dose at post I followed by ↑ sweating and temperature (98.3% for each) compared to none before the program.

None of the studied nurses' knew the signs of under dose before the program. On the other hand all nurses at post I stated that decreased heart rate, increased body weight and decreased temperature were the signs of under dose followed by constipation (98.3%).

The same table portrays that decreased T4, increased TSH were mentioned by 100%, 98.3% of nurses respectively at post I compared to 51.7% and 0.0% respectively before the program.

When the nurses were asked about the treatment of CH, 61.7% of them before the program answered that L-Thyroxine was the drug of choice compared to all nurses (100%) at post I&II. the result was statistically significant between the three phases of the program.

Table III illustrates that nurses' complete knowledge about their role regarding CH neonates. It was found that assessing physical growth as weight and height were mentioned by 76.7% & 10% of nurses respectively before the program compared to 100% for each at post I.

Measure temperature, pulse and respiration were mentioned by all nurses at post I compared to 76.7%, 3.3% and 0% respectively before the program as physiological measures.

When the nurses was asked about assessing reflexes no one knew them before the program compared to 100% of nurses at post I reported rooting, sucking, grasping, dancing, moro and tonic neck reflexes followed by babiniski (80%).

The same table shows that all nurses knew auditory and visual response at post I as a behaviors response compared to none before the program. In addition 100% of nurses at post I stated inanimate auditory and visual were orientation response compared to none before the program. The result was statistically significant between the three phases of the program.

Nurses' performance toward CH neonates was illustrates in table IV. It was found that measure temperature. And assess weight was done by 80% & 78.3% of nurses respectively before the program compared to 100% at post I as well as all of them assess height and measure pulse and respiration.

When the nurses was observed before the program it was found that no one assess the reflexes compared to all nurses at post I except tonic neck reflex (98.3%) and babiniski (88.3%).

Moreover, When the nurses was observed before the program it was found that no one of nurses assess behavioral and orientational responses compared to 100% of them did it at post I, the result was statistically significant.

It was also found that all nurses did not give any instructions to parents before program implementation. On the other hand all nurses at post II instruct parents about periodic measures of T3 & T4, medication continuation, how to administer the drug as well as how to count pulse. In addition signs of over and under dose (98.3% for each), regular periodic follow up and signs of complication (71.7% for each), the result was statistically significant.

Total nurses' complete knowledge and practice score about hypothyroidism was shows in table V. Concerning to knowledge score, it was found that before program implementation 100% of nurses had poor knowledge score. On the other hand all nurses had good knowledge score at post II. One hundred percent of nurses had poor practice score before the program; while all of them had good practice score at post I as well as post II 56.70% of them had fair practice score. The result was highly significant.

Table VI portrays the relation between nurses' knowledge and practice score regarding CH. It was found that the nurses' knowledge is better than their practice as before program their mean knowledge score was 7.65 and mean practice score was 3.47. This mean score was improved at post I but still the knowledge better than practice as mean knowledge score was 111.7 compared to 46.9 mean practice score.

At post II the mean knowledge and practice score were slightly decreased to 75.85 and 33.77 respectively. The result was statistically significant. As ANOVA test was 9779.6 ( $P < 0.000$ ) for total knowledge score and 4294.3 ( $P < 0.000$ ) for total practice score.

#### 4. Discussion:

Thyroid hormones have been shown to be absolutely necessary for fetal brain development. Screening for thyroid hormone level in the first week of life is extremely important to identify infant with CH. World wide screening programs have been successful in decreasing childhood mental & physical retardation related to CH by early detection, treatment & proper nursing intervention<sup>(17)</sup>.

**Table I: Nurses Complete Knowledge about Definition, causes and manifestations of neonates and infants with CH:**

Nurses' knowledge	Pre		Post I		Post II		X2
	No	%	No	%	No	%	
<b>1- Definition of CH:</b>							
Deficiency of thyroid hormone which present before birth	1	1.7	58	98.3	41	68.3	193.4**
<b>2- Causes:*</b>							
• Agenesis of thyroid	0	0	54	90	19	31.7	105.6**
• Hypoplasia	0	0	47	78.3	9	15	116**
• Ectopic thyroid	0	0	42	70	8	13.3	111.3**
• In born error of thyroid hormone	28	46.7	60	100	58	98.3	131.8**
• Prenatal iodine deficiency	12	20	60	100	55	91.7	151.9**
• Maternal intake of goiterogens	0	0	60	100	35	58.3	122.2**
• Geographic iodine deficiency	1	1.7	58	96.7	30	50	107.4**
<b>3- Manifestations of neonates:*</b>							
• ↑ birth weight	2	3.3	60	100	60	100	208.0**
• Hypothermia	5	8.3	60	100	60	100	199.5**
• Cold dry skin	2	3.3	60	100	27	45	115.0**
• Poor feeding	1	1.7	60	100	17	28.3	132.0**
• Prolonged physiological jaundice	0	0	58	96.7	10	16.7	150.8**
• Hypotonia	5	8.3	60	100	56	93.3	175.3**
• Abdominal distension	1	1.7	59	98.3	47	78.3	140.7**
• Constipation	1	1.7	60	100	52	86.7	166.4**
• Wide anterior fontanel	0	0	58	96.7	16	26.7	132.3**
• Open loop posterior fontanel	0	0	58	96.7	2	3.3	1181.3**
<b>Manifestations of infancy:*</b>							
<b>A- Functional changes:</b>	0	0	54	90	18	30	107.8**
• Poor peripheral circulation	0	0	60	100	54	90	179.0**
• Diminished intestinal activity	1	1.7	60	100	58	96.7	198.3**
• Hypotonia	0	0	60	100	46	76.7	145.7**
• Abdominal distension	0	0	60	100	13	21.7	145.2**
• Dry skin	0	0	60	100	52	86.7	169.3**
• Physical changes	0	0	59	98.3	47	78.3	143.6**
• Mental changes							
<b>B- Retardation of G&amp;D:*</b> ☉	0	0	60	100	36	60	123.3**
• Stunted height	0	0	60	100	59	98.3	207.4**
• Over weight	0	0	57	95	4	6.7	167.7**
• Delayed osseous development	0	0	60	100	25	41.7	121.5**
• Delayed dental development							

\*More than one answer

\*\*Highly significant at  $P \leq 0.01$ 

☉ G&amp;D= Growth and Development

**Table II: Nurses' Complete Knowledge about Signs of Over and Under Dose, Diagnosis & Treatment of CH**

Nurses' knowledge	Pre		Post I		Post II		X2
	No	%	No	%	No	%	
<b>Signs of over dose*:</b>							
• ↑ sweating	0	0	59	98.3	34	56.7	116.3**
• ↑ heart rate	0	0	60	100	32	53.3	119.9**
• Diarrhea	0	0	60	100	43	71.7	136.8**
• Loss of weight	0	0	60	100	60	100	213.9**
• ↑ temperature	0	0	59	98.3	54	90	173.1**
<b>Signs of under dose*:</b>							
• ↓ heart rate	0	0	60	100	19	31.7	130.1**
• Constipation	0	0	59	98.3	51	85.0	159.1**
• ↑body weight	0	0	60	100	59	98.3	207.4**
• ↓temperature	0	0	60	100	56	93.3	189.6
<b>Diagnosis:</b>							
• ↓T4,6<5 Mg/dl	0	0	60	100	60	100	140.0**
• ↑TSH>20Mμ/ML	0	0	59	98.3	34	56.7	116.3**
<b>Treatment:</b>							
• L- Thyroxine	037	61.7	60	100	60	100	129**

\*More than one answer

\*\*Highly significant at P≤0.01

**Table III: Nurses' Complete Knowledge about their role regarding CH neonates**

Nurses' knowledge	Pre		Post I		Post II		X2
	No	%	No	%	No	%	
<b>Nurses' role:</b>							
<b>A- Assessing physical growth</b>							
• weight	46	76.7	60	100	60	100	114.1**
• height	6	10	60	100	51	85	148.1**
<b>B- Physiological measures</b>	46	76.7		100	60	100	
• Measure temperature	2	3.3	60	100	58	96.7	114.1**
• Measure pulse	0	0	60	100	28	46.7	195.4**
• Measure respiration			60				119.7**
<b>C- Assessing reflexes*</b>							
• Rooting	0	0	60	100	60	100	213.9**
• Sucking	0	0	60	100	40	66.7	129.8**
• Grasping	0	0	60	100	55	91.7	184.2**
• Dancing	0	0	60	100	16	26.7	136.8**
• Moro	0	0	60	100	52	86.7	169.3**
• Tonic neck	0	0	60	100	5	8.3	175.4**
• Babiniski	0	0	48	80	0	0	160.6**
<b>D- Assessing neonates behaviors</b>							
<b>1-Behavior response</b>	0	0	60	100	52	86.7	169.3**
• Auditory response	0	0	60	100	60	100	213.9**
• Visual response							
<b>2-Orientation response</b>	0	0	60	100	52	86.7	169.3**
• Inanimate auditory	0	0	60	100	56	93.3	189.6**
• Inanimate visual							

\*More than one answer

\*\*Highly significant at P≤0.01

**Table IV: Nurses' Performance toward CH neonates and about Health Instructions Given to Parents Having CH infants**

Nurses' Performance	Pre		Post I		Post II		X2
	No	%	No	%	No	%	
- Assess_weight	47	78.3	60	100	60	100	112.5**
- Assess height	7	11.7	60	100	48	80	133.6**
- Measure temperature	48	80	60	100	60	100	111.0**
- Measure pulse	2	33	60	100	60	100	208.0**
- Measure respiration	0	0	60	100	28	46.7	119.7**
<b><u>Assessing reflexes*</u></b>							
• Rooting	0	0	60	100	58	96.7	201.2**
• Sucking	0	0	60	100	47	78.3	149.1**
• Grasping	0	0	60	100	55	91.7	184.2**
• Dancing	0	0	60	100	10	16.7	155.2**
• Moro	0	0	60	100	50	83.3	160.6**
• Tonic neck	0	0	59	98.3	8	13.3	158.4**
• Babiniski	0	0	53	88.3	0	0	174.0**
<b><u>Assessing neonates behaviors</u></b>							
<b>1-Behavior response</b>							
• Auditory response	0	0	60	100	53	88.3	174.1**
• Visual response	0	0	60	100	60	100	213.9**
<b>2-Orientation response</b>							
• Inanimate auditory	0	0	60	100	35	58.3	122.2**
• Inanimate visual	0	0	60	100	57	95.0	195.3**
<b><u>Health instructions*</u></b>							
- Signs of over dose	0	0	59	98.3	56	93.3	183.6**
- Signs of under dose	0	0	59	98.3	56	93.3	183.6**
- Regular periodic follow up	0	0	43	71.7	10	16.7	104.7**
- Signs of complications	0	0	43	71.7	10	16.7	104.7**
- Periodic measures of T3 &T4	0	0	60	100	43	71.7	136.8**
- Importance of medication continuation	0	0	60	100	45	75	142.5**
- How to administer the drug	0	0	60	100	54	179.0	121.2**
- How to count pulse	0	0	60	100	34	121.2	

\*More than one answer

\*\*Highly significant at  $P \leq 0.01$ **Table V: Total Nurses' Complete Knowledge & Practice Score about Hypothyroidism**

Score	Pre		Post I		Post II		X2
	No	%	No	%	No	%	
<b><u>I- Knowledge</u></b>							
Poor	60	100	0	0	0	0	348.347 P=0.000**
Fair	0	0	0	0	58	96.700	
Good	0	0	60	0	2	3.30	
<b><u>II- Performance</u></b>							
Poor	60	100	0	0	0	0	251.163 P=0.000**
Fair	0	0	0	0	34	56.70	
Good	0	0	60	100	26	43.30	

\*\*Highly significant at  $P \leq 0.01$

**Table VI: Correlation between Total Nurses' Knowledge and Practice Score Regarding CH**

<b>Program phases</b>	<b>Knowledge score</b>	<b>Practice score</b>
<b><u>Pre program</u></b>		
Mean	7.65	3.47
S.D	3.507	1.873
<b><u>Post I</u></b>		
Mean	111.7	46.9
S.D	3.679	1.581
<b><u>Post II</u></b>		
Mean	65.07	28.04
S.D	43.43	18.425
<b><u>ANOVA Test</u></b>		
F	9779.6	4294.3
P	0.000**	0.000**

\*\*Highly significant at  $P \leq 0.01$

The present study shows significant improvement in nurses' knowledge after implementation of educational program regarding CH. It was found that the majority of nurses mentioned that inborn error of thyroid hormone and prenatal iodine deficiency were the most common causes of CH, and this result goes with Kempers et al<sup>(19)</sup>

whom found the effect of maternal Graves diseases on the fetal and neonatal thyroid gland and its function. Also supported by SaAYlam et al<sup>(20)</sup> and Saglam et al<sup>(21)</sup> whom found in their studies that increased incidence of CH in iodine deficiency area.

The result of the present study may be due to that these two causes were the most common causes of attendancy at Zagazig City as the data collected from rural area and these areas found to be deficient in iodine.

On the other hand other studies added that low birth weight was the cause of CH<sup>(22)</sup>, while, Mcelduff et al<sup>(23)</sup> found that babies delivered by cesarean section were significantly more likely to have CH than those delivered vaginally. In addition, Veiga et al<sup>(24)</sup> found in their study that there was seasonal variation as TSH collected in the summer were some what higher than those collected in the winter. While Mengreli et al<sup>(25)</sup> added that the cause of CH was maternal autoimmune thyroid disease.

As regards to manifestations of neonates, it was found that all nurses reported increase birth weight & hypothermia as a manifestation of CH followed by hypotonia and this result may be due to that these manifestations were obvious to nurses to see it, as it is routinely measured every visit. On the other hand the rest of manifestations were known by nurses after the program. These finding support the hypothesis that educational program related to health problems impact health knowledge and care<sup>(26)</sup>.

Over weight as a manifestation of CH during infancy were reported by the majority of nurses weighing the infant routinely every visit, so it is obvious to her the increase in his body weight. This result clarified by the fact that the thyroid gland did not secrete its hormone which result in slow rate of metabolism thus leading to increase body weight<sup>(1,2,4)</sup>.

When the nurses were asked about signs of over and under dose, no one of them knows it before the program rather than after the program. This result may be that nurses from their point of view considered that this is not their responsibility but it is the doctor's responsibility.

All nurses mentioned that decrease level of T4 was the main diagnosis and it is done on the third day after delivery and this result supported by Kempers et al<sup>(7)</sup> and Silva et al<sup>(8)</sup> who cited that screening test for CH should be done in the first week of life. On the other hand Ordoorkhani et al<sup>(10)</sup> recommended in his study done at Iran that screening test should be done since birth at delivery room.

L-thyroxine is the drug of choice which mentioned by all nurses and this result go with Rose et al<sup>(27)</sup>, Lafranchi et al<sup>(28)</sup>, Nakamizo et al and Yang et al<sup>(30)</sup> whom found that L- thyroxine treatment leads to normal or near normal neurocognitive outcome in infants with CH. In addition, Kato et al<sup>(31)</sup> reported normal growth and development of CH neonates whom treated with L- thyroxine. Treatment and diagnosis were mentioned by all nurses, and this result may be due to that screening program for CH is mandatory now in Egypt and is done in the first week of age.

Most neonates born with CH have normal appearance and no detectable physical signs. Hypothyroidism in the newborn period is almost always overlooked and delayed diagnosis leads to the

most severe outcome of CH as a mental & physical retardation<sup>(6)</sup>. So, the nurse had a great role toward assessing those neonates. The present study portrayed that the majority of nurses were assessed physical & physiological measures, and thus may be due to that these measures were done routinely to the neonates every visit and also they consider that this was their role to do it. On the other hand the majority of them did not assess reflexes before program but they assess it at post I & post II, this may be clarified that they were considered this part of assessment was the responsibility of the pediatrician and after the program they know the importance of doing it because it reflects the neurodevelopment of the neonates and this goes with the opinion of many researchers<sup>(9,12)</sup> as well as Brazelton<sup>(18)</sup> at his assessment in his scale.

Assessing behavior and orientation responses is another role of pediatric nurse as she can discover the progress of development of neonates with CH. The present study shows that no one of nurses did this assessment before program but the majority of them did it at post I & post II and this reflects the importance of educational program in guidance and development of nurses. This finding goes with Joseph<sup>(32)</sup>, Kempers et al<sup>(33)</sup>, Hopfner et al<sup>(34)</sup> and Rovet<sup>(35)</sup> whom found that assessing cognitive and motor functioning is very important to know the developmental milestone of the neonate and discover any retardation as early as possible.

When the nurses were observed to evaluate their intervention after program implementation, it was found that there was significant improvement in their performance as they assessed growth and development, measure vital signs and assess reflexes as well as assess behavior and orientation responses. This finding may be due to the efficacy of training program, guidance & supervision. In addition, they did not know the importance of their role in preventing mental & physical impairment of CH neonates before the program but after the program they begin to know their role. This result supported by many studies<sup>(36,37)</sup>

As regards to health instructions given to parents, all of nurses did not give any instructions before program but the majority of them gave it at post I & II. This finding may be due to shortage number of staff in relation to the number of cases as some nurses were busy by the administrative work as well as improper environment to give the instructions (over crowding). In addition, there was no motivation, encouragement and supervision as well as guidance. So, when they attend the program and understand the importance of their role regarding

CH neonates, they became enthusiastic in their work. This result was supported by some researchers<sup>(36,37)</sup>.

It was found that all of nurses had poor knowledge score before the program, while 60% had good score in post I and the majority had fair in post II. This result may be due to that the majority of nurses had secondary nursing school education and they did not study these subjects in their curriculum, and their source of information about CH from the present program. In addition, the majority of them did not attend any previous educational programs about CH before. This finding supports the hypothesis of the importance of the educational program related to health problems on the nurses' performance<sup>(26)</sup>.

As regards to nurses' performance it was found that all of them had poor practice score pre program, while the majority of them had fair & good practice score post I & II. This result reflects the impact of training course to enhance the nurses' technical knowledge and skills<sup>(37)</sup>.

## 5. Conclusion:

Nurses' performance were improved after the educational program as all of them had poor knowledge & practice score before the program, while the majority of them had fair & good score after the program.

## Based on the previous finding and results of the present study, the study recommended that: -

- 1- Educational program should be mandatory and continuous for nurses who are working at well baby clinic about CH.
- 2- Provide adequate head nurse for supervision, guidance and regular feedback to nurses about their performance.
- 3- Design clinical protocol and guidelines about CH to be exist in each MCH.

## Correspondence author

Amal Mohamed El-Dakhakhny  
Pediatric Nursing Dept., Faculty of Nursing, Zagazig University, Zagazig, Egypt.  
[dr\\_amal2001@yahoo.com](mailto:dr_amal2001@yahoo.com)

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