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Effectiveness of Health Education toward Healthcare Knowledge Improvement about Congenital Hypothyroidism Newborn Screening

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Background: The most frequent congenital endocrine disorder in children is congenital hypothyroidism (CH). In Indonesia, CH's prevalence is greater than the data currently available. However, CH newborn screening has only been carried out in a few locations across Indonesia. Therefore, there is a need to raise primary healthcare practitioners' understanding of the CH Screening Program. **Materials and Methods:** This study used a pre-posttest design to gauge the healthcare professionals' knowledge of newborn congenital hypothyroid screening. After intervention, a post-test was given. The categorical measures' descriptive statistical analysis results were presented as a mean, median, percentage (%), and frequency (n) distribution table. The improvement in healthcare professionals' understanding of newborn CH screening was evaluated using the *Paired Samples test*. The cutoff for statistical significance was $p<0.05$ using SPSS version 20.0. **Results:** In our study, most of the participants were midwives with a total of 21/53 (39.62%) followed by nurses with 19/53 (35.83%). There was also an increase in the score where previously in the pretest only 1 person got a score above 80, then it increased to half of the participants, namely 49.06% (26/53) who got better scores. months and 37/54 (68.5%). With the Paired Sample test, we prove that there is a significant increase in the participants' scores, and the data obtained is $p<0.05$, which means that there is an increase in the average data from the pretest to the post-test. **Conclusion:** There was an improvement in pre-posttest knowledge of healthcare who had been given education about CH newborn screening.

Key Words: Congenital hypothyroidism, Newborn screening, Knowledge

Introduction

Congenital hypothyroidism (CH) is the most prevalent congenital endocrine condition in children.[1,2] Thyroid hormones are essential in growth and neurological development, especially during the first years of life. Thus hypothyroid screening during childbirth can prevent mental retardation and disability.[3]

The global prevalence of CH is 1 per 3000 to 4000 births.[1,2] In Indonesia, the incidence of CH is estimated to be higher than the existing data.[4] The prevalence in Indonesia is 1 per 2513 birth, based on CH screening in 14 provinces. CH rarely manifests during childbirth and becomes misdiagnosed if not screened.[5] However, neonatal CH screening in Indonesia has not been implemented nationally, only in selected regions and hospitals.[4] Hence, CH often

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goes undetected and is found too late.[6)]

The newborn screening program for CH has been mandatory by the Minister of Health of the Republic of Indonesia since 2014. However, the implementation is still challenging due to the screening not being covered by universal health insurance.[7)]

The first level of health facility (Public Health Center or Puskesmas) plays a vital role in the Congenital Hypothyroid Screening program. Puskesmas not only does the specimen collection and examination, but also provides communication, information, education, follow-up on screening results, diagnosis, management, case monitoring, organization, and program monitoring-evaluation.[8)] This study aims to increase the awareness and knowledge of CH and Congenital Hypothyroid Screening programs among primary healthcare professionals.

Materials and Methods

In this study, a pre-posttest design was used in order to assess the healthcare in their awareness of congenital hypothyroid screening for newborns. Congenital hypothyroid screening for newborn instruction was delivered through online meetings with experts as part of the strategy. Indonesian Bahasa was used to teach health education through seminars and group discussions. Participants took a pre-test evaluating their general knowledge of congenital hypothyroid screening for newborns before the intervention. A post-test was taken once the intervention was over. Volunteers from Indonesian healthcare facilities in East Java (Driyorejo Public Health Center, Gresik) were made the study's sample. The following criteria were used to determine inclusion: age above 18, communication skills, and willingness to participate in a survey. Consent from participants was gained in advance using consecutive sampling. This project received ethical clearance from the connected university under number 138/EC/KEPK/FKUA/2022. In this study, samples' age, gender, employment status, and educational background were recorded via an online self-reported questionnaire that participants completed. Using a self-created questionnaire based on our previous study, participants' knowledge of the fundamentals of congenital hypothyroid screening in the newborn was assessed.

Table 1. Demographic characteristics of samples

Variables	n (%) (n=53)
Gender	
Male	7 (13.21)
Female	46 (86.79)
Age	38.87±8.63
Educational background	
Diploma degree	35 (66.04)
Bachelor degree	17 (32.08)
Doctoral degree	1 (1.89)
Job	
Nurse	19 (35.85)
Midwife	21 (39.62)
Medical doctor	9 (16.98)
Pharmacist	1 (1.89)
Nutritionist	3 (5.66)

Statistical Analyses

Descriptive statistical analysis of the categorical measures was reported as mean, median, percentage (%), and frequency (n) distribution table. The improvement of knowledge of healthcare about CH screening for newborns was analyzed by *Paired Samples Test*. Statistical significance was set at $p<0.05$. The statistical analyses were performed using SPSS version

Table 3. Interpretation of sample's knowledge

Interpretation	Range	Pretest n (%)	Posttest n (%)
Good	80-100	1 (1.89)	26 (49.06)
Average	60-79	29 (54.72)	18 (33.96)
Poor	<60	23 (43.40)	9 (16.98)

Table 2. Comparison of pretest and posttest scores

Variable	N	Mean	Std. Deviation	Min	Max	Sig. (2-tailed)
Pre-test	53	59.24	7.69	46.67	80	0.000
Post-test	53	73.20	13.23	46.67	86.67	0.000

20.0. The Kolmogorov-Smirnov test was used to determine whether the data from the pretest and post-test scores were normal.

Results

This study had 53 participants and of them there were doctors totaling 9/53 (16.98%). Among 53 participants, most of them were Diploma degree and also 1 doctoral degree. The least participant is from the pharmacist (Table 1).

There was an improvement in the posttest score compared to the pretest where previously there were 23/53 (43.40%) participants who scored poorly in the pretest and increased in the posttest to 26 (49.06%) participants who scored well (Tables 2, 3). The data acquired is $p < 0.05$, which indicates that there has been an increase in the average data from the pretest to the post-test. Using the Paired Sample test, we demonstrate that the participant scores have sig-

Table 4. Questionnaire of congenital hypothyroidism (CH) newborn screening

No.	Questionnaire	Pretest		Post-test	
		Correct n (%)	Wrong n (%)	Correct n (%)	Wrong n (%)
Guidelines for CH newborn screening					
1	Examination of congenital hypothyroidism in newborns was done by checking the TSH	49 (92.45)	4 (7.55)	52 (98.11)	1 (1.89)
2	The most ideal blood specimen collection was immediately after the newborn until the age of 72 hours.	7 (13.21)	46 (86.79)	11 (20.75)	42 (79.25)
3	CH screening in newborns was positive if the TSH level was ≥20 mU/L.	50 (94.34)	3 (5.66)	48 (90.57)	5 (9.43)
4	Babies with positive screening results could already establish the diagnosis of CH, so there was no need to confirm with the re-examination of serum TSH and FT4.	24 (45.28)	29 (54.72)	38 (71.70)	15 (28.30)
5	The diagnosis of CH was made when the TSH level was low and the FT4 was high	12 (22.64)	41 (77.36)	31 (58.49)	22 (41.51)
6	More than 95% of newborns with CH have no clinical signs at birth.	50 (94.34)	3 (5.66)	47 (88.68)	6 (11.32)
7	CH is one of the causes of mental retardation that could be prevented by early therapy.	51 (96.23)	2 (3.77)	52 (98.11)	1 (1.89)
8	Signs and symptoms that can appear in children with CH were lethargy (decreased activity), jaundice (yellow), macroglossia (large tongue), umbilical hernia (bulk), flat nose, constipation, and dry skin.	44 (83.02)	9 (16.98)	51 (96.23)	2 (3.77)
9	The sample was used in the form of blood taken by pricking the baby's heel (heelprick).	53 (100)	0 (0)	53 (100)	0 (0)
10	The puncture site was the medial part of the left or right heel.	0 (0)	53 (100)	20 (37.74)	33 (62.26)
11	Puncture the heel with a disposable sterile lancet to a depth of 2 mm.	51 (96.23)	2 (3.77)	53 (100)	0 (0)
12	The blood that comes out is dripped on a special filter paper until the paper circle was full of blood, then after it was dry, it was sent to the CH screening laboratory.	50 (94.34)	3 (5.66)	53 (100)	0 (0)
13	After the heel was pierced, the first drop of blood was directly dripped onto the filter paper.	12 (22.64)	41 (77.36)	31 (58.49)	22 (41.51)
14	In order to be examined, at least two full circles of filter paper blood specimens are required.	3 (5.66)	50 (94.34)	1 (1.89)	52 (98.11)
15	If the blood didn't come out, the examiner can make a squeezing motion on the baby's heel.	11 (20.75)	41 (77.36)	32 (60.38)	21 (39.62)

FT4: free thyroxine, TSH: thyroid stimulating hormone

nificantly increased.

The detail of the questionnaire is described in Table 4.

Discussion

This study showed that education should be viewed as an important factor in empowerment for all healthcare. This approach should enable all healthcare to use knowledge and practical skills in a newborn screening program of CH for better care. The clinical manifestation of CH, which is undetected at or around birth, occurs too late for treatment to reverse the resulting mental and growth retardation. CH may not be detected at all in many neonates, which places an unwarranted financial, social, and medical burden on the family. Infants who receive early diagnosis and treatment typically grow up without mental disabilities and can contribute positively to society. With effective screening, the newborn with CH can be diagnosed early and treated early about their disease.[9)]

From the result, we can also see that the subject mostly were female at the age around 38, and mostly of their job were nurses where it was also reported in a previous journal in Brazil that it was known that many of their subjects were female caregivers who were more concerned with pediatric patients because many of them also had children.[10)]

Our study showed significant gains in knowledge and attitude following counseling in a healthcare unit. In previous study, there was a comparable improvement in attitude was shown with CH screening for newborn tests. The results also led to a comparable modification in practice.[11)]

This result also shows that there was a difference in the pretest and post-test scores in subjects after being given education about the importance of newborn screening for CH, it was intended that pediatric patients suffering from CH can be treated early. This was also stated in another journal where there was a significant difference in the quality of life of a child with CH in which one of them was given early treatment after newborn screening was done compared to children who already have symptoms of hypothyroidism and had just been treated.[12)]

In conclusion, the findings of several studies highlight the difficulties healthcare faces in screening for CH in newborns. Although this course of screening is simple, it may not provide adequate education. According to the data presented, that well-educated healthcare with essential information about CH in newborns and its screening processes present higher chances of early screening of CH in newborns.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

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