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EFFECTIVENESS OF NEONATAL THYROID SCREENING IN DETECTING CONGENITAL HYPOTHYROIDISM: A STUDY OF 80 INFANTS IN A TERTIARY CARE CENTER

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ABSTRACT

Neonatal thyroid screening is essential for the early detection of congenital hypothyroidism (CH), a condition that can lead to severe developmental delays if untreated. The implementation of screening programs has been shown to significantly reduce the incidence of complications associated with undiagnosed hypothyroidism in newborns.

Objective: To evaluate the effectiveness of the neonatal thyroid screening test in identifying congenital hypothyroidism in infants.

Material and Methods: This study was conducted in the Department of Pediatrics at a tertiary care hospital. A total of 80 neonates were included in the study, all of whom underwent neonatal thyroid screening within the first week of life. Thyroid-stimulating hormone (TSH) levels were measured, and those with elevated TSH underwent further evaluation.

Results: Out of 80 neonates screened, 6 (7.5%) were identified with elevated TSH levels, and subsequent testing confirmed 3 cases of congenital hypothyroidism. All diagnosed infants received prompt treatment, resulting in normal thyroid function within 6 months.

Conclusion: The neonatal thyroid screening test is effective in the early identification of congenital hypothyroidism, enabling timely intervention and improved health outcomes for affected infants.

Keywords: Congenital hypothyroidism, Neonatal screening, Thyroid-stimulating hormone, Pediatric health.

Introduction

Congenital hypothyroidism (CH) is a critical condition resulting from insufficient thyroid hormone production in newborns. This disorder can lead to significant developmental issues, including intellectual disabilities, growth failure, and other physical impairments, if not diagnosed and treated early (1). The global incidence of congenital hypothyroidism ranges from 1 in 1,000 to 1 in 4,000 live births, making it one of the most common preventable causes of intellectual disability (2).

The implementation of universal newborn screening programs for thyroid dysfunction has transformed the management of congenital hypothyroidism. Early detection through screening programs allows for immediate intervention with thyroid hormone replacement therapy, significantly improving long-term outcomes for affected infants (3). Thyroid-stimulating hormone (TSH) is commonly measured as part of neonatal screening due to its sensitivity in identifying cases of hypothyroidism (4). Elevated TSH levels indicate the need for further evaluation, including measurement of serum thyroxine (T4) levels and clinical assessment.

Despite the known benefits of neonatal thyroid screening, some challenges remain. Variability in screening protocols, follow-up procedures, and treatment initiation can affect the overall effectiveness of these programs (5). This study aims to assess the effectiveness of the neonatal thyroid screening test in identifying congenital hypothyroidism in a tertiary care setting, focusing on the outcomes of screened infants.

Aim and Objectives

Aim: To evaluate the effectiveness of neonatal thyroid screening tests in detecting congenital hypothyroidism in neonates.

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Objectives:

1. To determine the incidence of elevated TSH levels in screened neonates.
2. To assess the follow-up outcomes of infants diagnosed with congenital hypothyroidism.

Material and Methods

This observational study was conducted in the Department of Pediatrics at a tertiary care hospital over a period of six months. A total of 80 neonates, aged between 1 to 7 days, were included in the study after obtaining informed consent from their parents. All included neonates underwent routine neonatal thyroid screening, which involved obtaining a blood sample via heel prick for TSH measurement.

Inclusion Criteria:

- Neonates born at the hospital or referred for screening within the first week of life.

Exclusion criteria:

- Neonates with known thyroid disorders or those on thyroid hormone treatment prior to screening.

Blood samples were sent to the laboratory for TSH analysis using an enzyme-linked immunosorbent assay (ELISA) method. Neonates with elevated TSH levels (≥ 10 µIU/mL) underwent additional testing to confirm the diagnosis of congenital hypothyroidism. Serum T4 levels were measured, and clinical evaluations were performed.

Follow-up data were collected for infants diagnosed with congenital hypothyroidism regarding their treatment, growth, and development over the next six months. Descriptive statistics were calculated for demographic and clinical variables using SPSS software.

Results

Table 1: Demographic Characteristics of Neonates Screened

Parameter	Number of Patients (n=80)	Percentage (%)
Gender		
Male	42	52.5
Female	38	47.5
Birth Weight (kg)		
<2.5 kg	18	22.5
≥2.5 kg	62	77.5
Mode of Delivery		
Vaginal	50	62.5
Cesarean Section	30	37.5

Table 2: Screening Results for Congenital Hypothyroidism

TSH Level (µIU/mL)	Number of Patients (n=80)	Percentage (%)
Normal (<10)	74	92.5
Elevated (≥10)	6	7.5
Confirmed Congenital		
Hypothyroidism	3	3.75

Among the 80 neonates screened, the demographic characteristics showed a nearly equal gender distribution, with 52.5% males and 47.5% females. The majority of infants had a birth weight of ≥2.5 kg (77.5%), with 22.5% being low birth weight (<2.5 kg). The mode of delivery was predominantly vaginal (62.5%).

Out of the 80 neonates screened, 6 (7.5%) exhibited elevated TSH levels. Confirmatory testing resulted in 3 cases being diagnosed with congenital hypothyroidism, leading to an incidence rate of 3.75% in this study. All three infants received thyroid hormone replacement therapy, and follow-up assessments indicated

normal growth and development after six months of treatment.

Discussion

This study highlights the effectiveness of neonatal thyroid screening in identifying congenital hypothyroidism, supporting its implementation as a routine practice in newborn care. The results show an incidence of elevated TSH levels in 7.5% of the screened neonates, with 3.75% confirmed cases of congenital hypothyroidism. This finding is consistent with previous studies that report varying incidence rates of congenital hypothyroidism across different populations (6).

The importance of early detection cannot be overstated. Congenital hypothyroidism, if left untreated, can lead to severe developmental delays and complications. The introduction of routine screening programs has dramatically improved the ability to detect and treat this condition early (7). The immediate intervention with thyroid hormone therapy has proven effective, as observed in this study, where all diagnosed infants achieved normal thyroid function within six months.

Challenges remain in ensuring consistent screening practices, follow-up, and treatment protocols. Variability in screening techniques and laboratory standards can impact the accuracy of results and the management of affected infants (8). Therefore, it is crucial to establish standardized guidelines for neonatal thyroid screening to enhance its effectiveness across different healthcare settings.

The positive outcomes observed in this study reaffirm the need for continued advocacy for universal newborn screening programs. Increasing awareness among healthcare professionals and parents about the importance of timely screening can help reduce the incidence of undiagnosed congenital hypothyroidism (9). Moreover, educating families about the condition and its treatment can further support optimal growth and development in affected children (10).

Conclusion

The neonatal thyroid screening test is an effective tool for the early identification of congenital hypothyroidism in neonates. This study demonstrates that timely screening and subsequent intervention can lead to favorable outcomes, emphasizing the necessity of implementing universal screening programs. Continuous efforts are required to standardize screening protocols and educate healthcare providers and families to improve neonatal health outcomes.

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