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ORIGINAL ARTICLE

Frequency of congenital hypothyroidism in healthy newborns.

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ABSTRACT… Objective: To determine the frequency of congenital hypothyroidism (CH) in healthy newborns. **Study Design:** Cross-sectional study. **Setting:** Department of Neonatology, Children Hospital & Institute of Child Health Multan. **Period:** July 2020 to January 2021. **Material & Methods:** Neonates of both genders between 48 hours of life to 28 days of age delivered after 37-weeks of gestation were analyzed. All the neonates underwent blood sample testing for congenital hypothyroidism (T4 and TSH). The CH was described as neonates having T4 levels < 0.85 ng/dl and TSH > 40 mIU/L. Frequency of CH (yes/no) was noted. **Results:** Of these 146 study cases, 77 (52.7 %) were male participants while 69 (47.3 %) were female. Mean gestational age of our study cases was 38.12 ± 0.78 weeks. Of these 146 study cases, 40 (27.4 %) belonged to rural areas and 106 (72.6 %) belonged to urban areas. Poor socioeconomic status was noted in 46 (31.5%) while 100 (68.5%) were from middle income families. Of these 146 study cases, 109 (74.7%) were born vaginally while 37 (25.3%) were born through cesarean section. Family history of hypothyroidism was positive in 15 (10.3) cases. Mean body mass index of their mothers was 24.21 ± 2.33 kg/m^2 and maternal obesity was present in 22 (15.1 %) in our study cases. Congenital hypothyroidism was noted in 12 (8.2%). **Conclusion:** High frequency (8.2%) of congenital hypothyroidism was noted in healthy newborn babies. Congenital hypothyroidism was significantly associated with mode of delivery and family history of hypothyroidism.

Key words: Congenital Hypothyroidism, Healthy Neonates, Thyroid.

INTRODUCTION

The lack of thyroid hormone at the time of birth is termed as congenital hypothyroidism (CH).[1] For the normal growth of the central nervous system (CNS), the function of thyroid hormone is very important. It has been noted that the lack of thyroid hormone comes out to be the main and frequently observed reason among mentally retarded patients.[2] The prevalence of CH is found to be around 1 per 2000 neontes.[3]

During the clinical examinations newborns with CH are usually symptoms free or represent very vague symptoms. Neonates with CH are usually less active and sleep for longer durations while constipation and jaundice are also common in these neonates.[4,5] Neonates with CH are also at increased risk of developing large fontanels, inflated abdomen accompanied by umbilical hernia and hypotonia.[4,5] It is necessary to filter the CH patients from newborns within 2-5 days of their birth.[6] For this purpose, blood spot T4 or thyroid-stimulating hormone (TSH) or both can be performed for the evaluation of CH. Elevated serum TSH is one of the major indicator of CH. The blood in the umbilical cord is used for THS evaluation in some introductory studies performed.[7] As the radioimmunoassay progressed, such measures were adopted on a very large scale, to evaluate THS and thyroxine (T4) from blood spots on filter paper, collected for the evaluation of newborns.[8] Anjum A et al from Lahore, Pakistan, presented that 0.8% (4/550) newborns were spotted with CH.[9] Another study in healthy neonates from Karachi by Noreen R et al revealed that 16.3% neonates had high TSH levels (>40 uU/ml).[10]

Lack of proper screening for CH among neonates could be leading towards missed cases of CH in

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our region so the current research was planned to find out the existing burden of CH among neonates presenting to us. The objective of this study was to determine the frequency of CH in healthy newborns.

MATERIAL & METHODS

This cross-sectional study was done at The Department of Neonatology, Children Hospital & Institute of Child Health Multan Pakistan from 15-07-2020 to 14-01-2021. A sample size of 146 neonates was calculated considering P=16.3%[10], absolute precision (d) of 6 % confidence level (1-α) of 95 %. Inclusion criteria were neonates of both genders between 48 hours of life to 28 days of age delivered after 37-weeks of gestation. Children were enrolled from both inpatients and outpatient departments. Neonates of mother on antithyroid drugs or those using thyroxine were excluded. Neonates with congenital anomalies (likely chance of associated thyroid dysfunction) or those already on thyroxine therapy were excluded. Permission from the institutional ethical review committee was sought (ICH/EC-32, dated 06-08-2021).

One hundred and forty six neonates fulfilling the inclusion criteria, presenting to in-patient and outpatient department were enrolled after informed written consent of the parents describing them the study objectives and explaining that no risk is involved by participating into the study. After enrollment, baseline demographic data including age, gender, mode of delivery (spontaneous vaginal delivery (SVD/Caesarean section) and family history of hypothyroidism (in first degree relatives) was noted. All the neonates underwent blood sample testing for congenital hypothyroidism (T4 and TSH) from a single institutional laboratory. All the information was noted on the proforma specifically designed for the study. Congenital hypothyroidism (CH) was described as neonates having T4 levels < 0.85 ng/dl and TSH > 40 mIU/L. Standard protocols were adopted for all laboratory investigations and treatment protocols.

All the data was entere and analyzed through SPSS version 26.0. The quantitative variables like age (in days), T4 level (ng/dl) and TSH (mIU/L) were presented as mean and standard deviation. The qualitative variables like gender, family history of hypothyroidism (yes/no) and congenital hypothyroidism (yes/no) were presented as frequency and percentages. The data was stratified on age groups, gender and family history of hypothyroidism to see the effects on frequency of CH. Post stratification chi-square test was applied. A p-value of ≤ 0.05 was taken as significant.

RESULTS

Of these 146 study cases, 77 (52.7 %) were male participants while 69 (47.3 %) were female. Mean gestational age was 38.12 ± 0.78 weeks (ranging between 38 weeks to 41 weeks). There were 40 (27.4%) neonates who belonged to rural areas and 106 (72.6%) from urban areas. Poor socioeconomic status was noted in 46 (31.5%) while 100 (68.5%) were from middle income or above families. There were 109 (74.7%) neonates who were born through spontaneous vaginal delivery while 37 (25.3%) were born through cesarean section. Family history of hypothyroidism was positive in 15 (10.3%) neonates. Mean body mass index of mothers was 24.21 ± 2.33 kg/m^2 and maternal obesity was present in 22 (15.1 %) mothers. Congenital hypothyroidism was noted in 12 (8.2%) neonates.

Stratified with regards to gender, gestational age, residential status, mode of delivery, family history of hypothyroidism, maternal obesity and socioeconomic status is shown in Table-I and it was noted that vaginal delivery (p=0.0351) and family history of CH (p<0.0001) were significantly associated with CH among newborns.

DISCUSSION

In this study, 52.7% cases were boys and 47.3% girls. Almost comparable results, 51.1% for male patients, were presented in a study performed in Lahore.[11] Habib et al from Saudi Arabia noted 51% admitted babies to be male.[12] An Ethiopian study also represented a resemblance with our findings where 51% admitted babies were boys.[13]

Study Variables		Congenital Hypothyroidism		P-Value
		Yes (n=12)	No (n=134)	
Gender	Male (n=77)	7 (58.3%)	70 (52.2%)	0.6853
	Female (n=69)	5 (41.7%)	64 (47.8%)	
Gestational Age	Up to 39 weeks (n=116)	12 (100%)	104 (77.6%)	0.0659
	More than 39 weeks (n=30)	-	30 (22.4%)	
Residence	Rural (n=40)	4 (33.3%)	36 (26.9%)	0.6303
	Urban (n=106)	8 (66.7%)	98 (73.1%)	
Mode of Delivery	Vaginal Delivery (n=109)	12 (100%)	97 (72.4%)	0.0351
	Cesarean section (n=37)	-	37 (27.6%)	
Family History of Hypothyroidism	Yes (n=15)	9 (75.0%)	6 (4.5%)	<0.0001
	No (n=131)	3 (25.0%)	128 (95.5%)	
Maternal Obesity	Yes (n=22)	3 (25.0%)	19 (14.2%)	0.3154
	No (n=124)	9 (75.0%)	115 (85.8%)	
Socioeconomic Status	Poor (n=46)	4 (33.3%)	42 (31.3%)	0.8869
	Middle income or above (n=100)	8 (66.7%)	92 (68.7%)	

Table-I. Stratification of congenital hypothyroidism with regards to study variables (N = 146)

DISCUSSION

In this study, 52.7% cases were boys and 47.3% girls. Almost comparable results, 51.1% for male patients, were presented in a study performed in Lahore.[11] Habib et al from Saudi Arabia noted 51% admitted babies to be male.[12] An Ethiopian study also represented a resemblance with our findings where 51% admitted babies were boys.[13]

According to our study, mean gestational age of the neonates was 38.12±0.78 weeks while 79.5% neonates had gestational age between 37 to 39 weeks. Similar findings were also presented by Habib et al from Saudi Arabia.[12] Mean gestational of 38 weeks was mentioned in an Ethiopian study.[13] Manglik et al from India demonstrated the same findings as well.[14] There were 72.6% neonates who were from urban areas. It was also observed that 68.5% neonates belonged to middle or above socioeconomic status. A study from Lahore shared that majority of the CH cases were from low socioeconomic background.[11]

We observed that 8.2% neonates had CH. The research performed in Karachi by Noreen et al, mentioned the occurrence of CH to be 16.3% in terms of elevated TSH.[10] From India, Manglik et al observed similar findings where they showed the prevalence of CH to be 7.5% among neonates.[14] Our findings are also consistent with what Adeniran et al found.[15] We found significant association between mode of delivery and CH. Our findings are consistent with what has been reported in the local literature in the past by Ahmad A et al.[11] Seth A et al also reported significant association of mode of delivery and CH which is similar to what we observed.[16] Our study shows that there is a need to establish CH screening programs at national levels as these programs can assist clinicians in timely diagnosis and management of CH. More population bases multi-centric studies can also help us in better understanding about the burden of CH among newborns in our country.

Relatively small sample size and single center study are some of the limitations of this study. We also did not evaluate the outcomes among neonates who had CH in this study. We also included cases with family history of hypothyroidism so this was also one of the limitations.

CONCLUSION

Our study results point out the importance of screening program of congenital hypothyroidism (CH) which is one of the best achievements in pediatrics as high frequency of congenital hypothyroidism was noted in our study among healthy newborn babies. Congenital hypothyroidism was significantly associated with mode of delivery and family history of hypothyroidism.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Rooman Khalil	Data collection, Data analysis.	
2	Fatima Jabbar	Methodology, Drafting.	
3	Asim Khurshid	Study concept, Proof reading.	
4	Waqas Imran Khan	Literature review, Discussion.