



Int. J. New. Chem., 2022, Vol. 9, Issue 1, pp. 144-149.

International Journal of New Chemistry

Published online in <http://www.ijnc.ir/>.

Open Access

Print ISSN: 2645-7237

Online ISSN: 2383-188x



Original Research Article

Prevalence of Congenital Hypothyroidism in Children Referred to Health Centers in Tabriz

Lida Saboktakin*

Associate Professor of Pediatric Endocrinology & Metabolism, Rahat Breath and Sleep Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

Received: 2021-04-05

Accepted: 2021-10-19

Published: 2021-11-19

ABSTRACT

Given that the implementation of preventive measures and health policies in each country initially requires knowledge of the prevalence of each disease and the prevalence of diseases in different geographical areas are different, the present study aimed at Prevalence of congenital hypothyroidism in children referred to health centers in Tabriz. This cross-sectional descriptive study was conducted in 2019 with the participation of all children born in Tabriz (26,044 children). Sampling was by census method and all children were evaluated for TSH and T4 thyroid tests. Finally, the obtained data were analyzed. Recal rate was 6.2% and thus a serum test was performed for these infants and it was found that the prevalence of this disease was equal to 1 case in 289 infants. The prevalence in boys was 1 in 261 births and the prevalence in girls was 1 in 325 births. Thus, the prevalence of congenital hypothyroidism is higher in boys than girls, but this difference is not statistically significant ($P=0.128$). The prevalence of hypothyroidism in the study is higher than the average of other countries and geographical areas, which requires further studies in this area.

Keywords: Prevalence, Hypothyroidism , Children

Introduction

Congenital hypothyroidism is one of the most common preventable causes of mental retardation in the world and can only be prevented if diagnosed and treated early and in a timely manner (1). The prevalence of congenital hypothyroidism in the world averages 1 in 3,000 to 4,000 births, and in some races, such as Hispanics, it reaches 1 in 2,000 births. In Japan and North America, where enough iodine is consumed, one in 7,000 and 4,250 infants, respectively, has hypothyroidism (2 , 3). Evaluation of thyroid activity in infants has been very important and has received a lot of attention in the last three decades (4-6). Today, in many countries of the world, thyroid screening test is performed at birth for timely diagnosis and treatment. Depending on the etiology, thyroid dysfunction in infants may be transient or permanent (7-9). Transient increases in TSH refer to cases in which serum levels of TSH and T4 remain within the normal range after experimental cessation of replacement therapy after the age of three (10-13). Neonatal screening for the diagnosis of this disease is cost effective and in the last 40 years has been able to prevent the occurrence of mental disabilities in many patients and reduce the socio-economic burden of the disease (14-17). Congenital hypothyroidism screening programs, which are widely implemented in developed countries, provide an opportunity to study the etiology and pathogenesis of this disease. Studies in different parts of Iran have reported different prevalence of congenital hypothyroidism. For example, studies in Tehran, Shiraz and Isfahan have reported the prevalence of neonatal hypothyroidism at 1 in 914, 1 in 1433 and 1 in 370 births, respectively, which have in common a higher prevalence than the global average (18). Given that the implementation of preventive measures and health policies in each country initially requires knowledge of the prevalence of each disease and the prevalence of diseases in different geographical areas are different, the present study aimed at Prevalence of congenital hypothyroidism in children referred to health centers in Tabriz.

Methods

This study is a descriptive-analytical study that was performed cross-sectionally and by census method on 26044 live neonates born in Tabriz from the beginning of 2019 to the end of 2019. 4 drops of blood were collected from the heel of all infants (preferably on 3-5 days of birth) by neonatal autolant and transferred to Whatman903 filter paper. Sampling was done in 38 sampling centers in the city. After drying, the samples were transferred to the reference laboratory located in the center of the city by

Pishtaz post and were centrally analyzed for TSH by ELISA method. In cases where the infant was 3-7 days old at the time of sampling, TSH was less than $5\mu / L$ and for infants aged 8 days and older, TSH less than $4\mu / L$ was considered normal. According to the national instructions, the normal range of T4 was in the range of 16.3-6.5 micrograms per deciliter and the normal level of TSH was 9.9-1.7. For premature infants, underweight, multiples, hospitalized or with a history of hospitalization, history of receiving or transfusing blood, and history of taking certain medications such as dopamine in the second week of birth, screening was performed again from the heel. Neonates whose TSH was reported to be higher than the above numbers were considered suspicious. To confirm the diagnosis, samples were taken from them in a selected city laboratory and serum tests including T3RUP, TSH, and T4 were performed by ELISA method. For infants with TSH between 9.9-5 at 4 weeks, 19.9-10 at 2-3 weeks, and for infants with TSH above 20, a serum test was performed immediately to confirm the diagnosis. In the neonatal period (weeks 1 to 4), a T4 level of less than 6.5 micrograms per deciliter was considered the standard for definitive diagnosis of congenital hypothyroidism. However, the final diagnosis of the disease was the responsibility of a trained pediatrician in each city and based on the set of clinical symptoms and laboratory results. Neonatal data were recorded in a researcher-made form and after entering the questionnaire in SPSS environment were analyzed using chi-square and t-test.

Results

Out of 26,044 participants, 49.9% were girls and 50.1% were boys. The weight range of the infants was between 1000 and 5800 grams with an average of 3148 grams. The mean age of mothers was 25.1 with a standard deviation of 5 years. The age range of the neonates at the time of sampling was between 1 to 180 days and the mean was 7.2 days. TSH ranged from 0.1 to 70 and averaged $2.3\mu / L$. Table 1 shows the frequency distribution of TSH by sex. In the case of 181 infants, only the TSH group was less than 5, but the amount was not recorded, due to their health, their information was not used only in the comparison of TSH groups.

Table 1: Frequency distribution of TSH values by sex

TSH groups	Boys	Girls	Total
TSH<4	88.2%	89.6%	88.9%
5>TSH≥4	6.3%	5.6%	6.0%
9.9>TSH≥5	5.1%	4.6%	4.8%
19.9>TSH≥10	0.2%	0.15%	0.2%

TSH\geq20	0.2%	0.05%	0.1%
Total	100%	100%	100%

Recal rate was 6.2% and thus a serum test was performed for these infants and it was found that the prevalence of this disease was equal to 1 case in 289 infants. The prevalence in boys was 1 in 261 births and the prevalence in girls was 1 in 325 births. Thus, the prevalence of congenital hypothyroidism is higher in boys than girls, but this difference is not statistically significant ($P=0.128$). Of the screened infants, 83.2% lived in urban areas and 16.8% in rural areas. The prevalence of congenital hypothyroidism in urban areas was 1 in 315 births and in rural areas was 1 in 216 births. Although the prevalence is higher in rural areas, this difference was not statistically significant ($P=0.089$).

Conclusion

In this study, which was performed on 26044 neonates born during the year during 2019 in Tabriz city, the prevalence of neonatal hypothyroidism and transient increase in TSH was 1 in 290. Since it is not possible to comment definitively on the permanence or transient nature of this problem before the age of 3, the prevalence mentioned is related to the sum of these two conditions. Estimation of the prevalence of congenital hypothyroidism in countries with a well-established screening program is between 1 in 3,000 births and 1 in 4,000 births, so the prevalence in our study is about ten to 13 times that of other countries. The prevalence of neonatal hypothyroidism varies from 1:67 in Nigeria, 1: 789 in Pakistan, 1: 2735 in Turkey, and 1: 10,000 in black Americans. In Iran, according to limited studies, the prevalence of congenital hypothyroidism is different but compared to the global average is reported to be high. In a study conducted in Tehran from 2007 to 2010, the prevalence of congenital hypothyroidism was 1 in 914 infants. There are several reasons for the differences in the prevalence of congenital hypothyroidism in different parts of the world: 1. Use T4 or TSH tests alone for screening 2. Differences between conventional criteria for definitive diagnosis of neonatal hypothyroidism in different studies 3. Iodine deficiency in some parts of the world, which is known to be the cause of hypothyroidism and especially its transient type in infants 4. Ethnic, racial, and familial hereditary differences 5. Excessive use of iodine-containing antiseptics, especially in preterm infants, is a temporary cause of differences in the prevalence of congenital hypothyroidism. 6. Environmental factors that are one of the reasons for the increase in cases of congenital hypothyroidism in some

populations. In the present study, until the preparation of the article, the treatment of about 40% of the sick infants was stopped due to the normalization of the experiments after the experimental cessation of the alternative therapy, and therefore they are included in the transient TSH increase group. It is obvious that the definite number of cases of transient increase in TSH after the third year can be judged, so although it is expected that a significant proportion of patients with transient increase in TSH, however, the prevalence of congenital hypothyroidism in Yazd province is very high and to determine. The reasons for this require additional studies, especially a case-control study. However, the statistics related to the IDD program have declared the country and the province to be free of iodine deficiency. However, it seems that due to the high prevalence of the disease and especially its transient type, it is necessary to conduct more thorough studies to ensure the absence of iodine deficiency as one of the important causes of the disease. In most studies, the prevalence of the disease in females is higher than males, so that in Saudi Arabia the ratio of females to males is 8.1 in Estonia 4 to 1 and in the country 3 to 2. However, in the present study, the ratio of female to male sexual prevalence was 1 to 25.1, although it was not statistically significant. Providing more accurate statistics on the incidence of neonatal hypothyroidism in the city of Tabriz and related factors requires the implementation of congenital hypothyroidism screening program and repeat the study with a larger sample size and also identify cases of transient increase in TSH is a pilot study that requires further studies and additional studies.

Acknowledgment

This study is the result of a research project approved by the Pediatric Health Research Center, Tabriz University of Medical Sciences, code ethics number IR.TBZMED.REC.1399.1037. Therefore, the author of this article thanks the support of that center.

References

1. M. Rezaei, R. Tarviridi-zadeh. *Int. J. new chem.*, 76,86 (2019).
2. M.G. Moghaddam, R.H. Dabanlou, *J. Ind. Eng. Chem.*, 20,739 (2014) .
3. P. Velusamy, J. Das, R. Pachaiappan, B. Vaseeharan, K. Pandian, *J. Ind. Crops. Prod.*, 66,103 (2015) .

4. S.M. Pourmortazavi, M. Taghdiri, V. Makari, M.R. Nasrabadi, Spectrochim., J.Acta Mol. Biomol. Spectros., 139,1249 (2015).
5. B. Ajitha, Y.A.K. Reddy, P.S. Reddy, J.Mater, Sci. Eng. Chem., 49,373 (2015) .
6. M.S. Abdel-Aziz, M.S. Shaheen, El-Nekeety, A.A. Abdel-Wahhab, J. Saudi Chem. Soc., 356,363(2014).
7. D.A. Kumar, V. Palanichamy, S.M. Roopan, Spectrochim. Acta Mol. Biomol. Spec- tros., 127 (2014).
8. F. Alzahar, Int. J .new chem., 111,117(2017).
9. E. Bohloulbandi, P. Ahmadi Aval, Int. J. new chem., 356, 364 (2021).
10. A. Sarmad, Int. J. new chem., 62,68 (2016).
11. Z. Ahmadi, Int. J. new chem., 18,23 (2016).
12. N. Amini, G. Amin, Z. Jafari Azar, J.Nanomed. Res., 2,57(2017).
13. T. S. Nasiri Moghaddam, F. Roya Nikmaram, R. Ahmadi. Int. J. new chem., 72,77(2017).
14. R. Desai, V. Mankad, S. K. Gupta, K. Nanosci, J.Nanotechnol., 4, 30 (2012).
15. S. Agnihotri, S. Mukherji, S. Mukherji, J. R. Soc. Chem., 4, 3974 (2014).
16. K. khan, S. Javed., J. Sci. pro. 104(2021).
17. J.I. Hussain, S. Kumar, A.A. Hashmi, Z. Khan, J.Adv. Mater., 2,188 (2011).
18. A.A. Moosa, A.M. Ridha, N.A.Kadhim, int.J. Multidiscip. 135,146 (2016).

How to Cite This Article

Lida Saboktakin, "Prevalence of congenital hypothyroidism in children referred to health centers in Tabriz" International Journal of New Chemistry., 2022; DOI: 10.22034/ijnc.2022.1.10.