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Prevalence of Subclinical Hypothyroidism and Its Related Factors in Children with Developmental Disorders in The Western Parts of Iran.

Asadolah Fatholahpour[1], Aida Fatolahpour[2], Namali Azadi[3], and Alireza Eskandarifar[4*].

[1]Pediatrics Department, Faculty of Medicine, Kurdistan University of Medical Sciences, Sanandaj, Iran.
[2]Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran.
[3]Biostatistics department, school of public health, Iran University of Medical Sciences, Tehran, Iran.
[4*]Faculty of Medicine, Kurdistan University of Medical Sciences, Sanandaj, Iran .

ABSTRACT

Hypothyroidism is a condition in which the body experiences subnormal production of thyroid hormone that leads to reduction of body functions including developmental disorders in children. Therefore, current research aims to determine prevalence of subclinical hypothyroidism in children afflicted with developmental disorders referring to Besat treatment and medical educationclinicinSanandaj in 2015. This is an applied study conducted using a cross-sectional descriptive method on 188 children with developmental disorder who had referred to Besat medical education clinic in Sanandaj in 2015. The collected data were inserted into SPSS software, version 20, and standard deviation and mean were used to describe the data. Out of 188 children referring to the clinic, 13.3% were suffering from subclinical hypothyroidism, most of whom were 2-10 years-old and male (15.6%). Higher prevalence of subclinical hypothyroidism was seen in those children with weight and height percentiles less than 5%. Age and gender are significant factors in prevalence of subclinical hypothyroidism and lack of sufficient development of weight and height correlates with a higher prevalence of this disorder.

Keywords: subclinical hypothyroidism, age, height, gender, growth indicators

Corresponding author

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INTRODUCTION

Thyroid hormone is essential for natural growth, development, differentiation of neural cells and regulating body metabolism, whose function becomes more apparent in its shortage during congenital deficiency of iodine, untreated congenital hypothyroidism, severe neurological impairments and growth retardation [1]. Among thyroid-related diseases, subclinical hypothyroidism is defined as elevated serum thyroid-stimulating hormone (TSH) levels and elevated levels of serum free thyroxine (fT4). Patients with this disease lack any kinds of symptoms and they only suffer from a biochemical disorder [2].

Primary diagnosis of subclinical hypothyroidism is according to experimental tests when TSH concentration is higher than its normal range [3]. This disorder occurs in 5-15% of total population and 1.7-5.7% of children [4]. In another study, this value was obtained between 4 to 10 % for adults and less than 10% for children [5,6]. Nonetheless, history of subclinical hypothyroidism and its effects and outcomes in children has been studied by a few number of researchers [7,8].

Gawlik stated according to Biondi that children with this disorder reveal some nonspecific symptoms [9].The majority of children with hypothyroidism have a natural appearance and show scant clinical and non-specific symptoms at birth so that if diagnosis is solely based on clinical symptoms, the baby may suffer from incurable complications [10]. Today, regarding the significance of this disease, screening tests are conducted at birth [11].Doing this test and timely treatment lead to natural physical and brain development but failure or delay in treatment is followed by severe mental disorders [12].

Therefore, since hypothyroidism is due to lack of anabolic hormone that plays a vital role in development of a baby, and its deficiency causes serious complications such as mental problems, dwarfishness, small size of body and other problems, it is necessary to identify and treat the patients conveniently to prevent from the above problems.Current study aims to establish the prevalence of subclinical hypothyroidism in children referring to Besat Clinic in Sanandaj on the west of Iran with complaints about developmental disorder and its relationship with gender, age, weight and height.

MATERIALS AND METHODS

This applied study was conducted using a descriptive-analytical and cross-sectional method in 2015. Research community included 188 children in ages ranging from 2 to 18 with developmental disorder who referred to Besat medical education and treatment clinic in Sanandajand entered this study with census. Those children who had files in the archive but their thyroid hormone had not been examined or their test result had not been recorded were removed from this study. The children's height at standing position was measured and put on height percentile chart. Their weights were measured using a digital balance with a precision of 100 g and were put on weight-for-age percentile chart. Thyroid tests were measured using electrochemical methods. Children with weight or height under percentile 5% were considered with developmental disorders. Indeed, demographic information, growth indicators and history of thyroid diseases were extracted.

Developmental disorder indicator was investigated from two aspects including weight disorder and height development disorder that were obtained according to WHO's weight and height chart. For data analysis, statistical software SPSS, version 20 was used and descriptive statistics such as frequency, mean and index of dispersion were derived. Chi-square test and independent t-test were applied for comparisons.

Findings

Out of 188 children, 25 of them (13.3%) were suffering from hypothyroidism. The average age for children with subclinical hypothyroidism was 6.51 years-old but for those without this disorder, it was 9.08 years-old (table 1).

Diagram 1 well-demonstrates the children's age in both hypothyroidism and non-hypothyroidism groups and age variability was higher in the non-hypothyroidism group. Nearly, 60% of children were under 10 years old and 80% of hypothyroidism was noticeable in this age group. However, t-test indicated a significant difference between these two groups in terms of average age ($p<0.001$ and $t = 3.67$).

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In terms of gender, boys, 13 in number (6.9%) had the highest levels of hypothyroidism compared to girls (table 2). Manner of gender distribution of children in both hypothyroidism and non-hypothyroidism groups is given on the right side of diagram 1. Chi-square test did not demonstrate a significant correlation between gender and hypothyroidism in children (p-value= 0.5269, X-squared= 0.4003, df=1).

Weight growth percentile for most of our study subjects was larger than 5 (54.1%) while the highest prevalence of hypothyroidism was observed in the grow percentile less than 5 (7.4%). Height growth percentile of the subjects was larger than 5 (60.4%) so that the greatest prevalence of hypothyroidism (8%) was found in them (table 3).

Chi-square test was not suggestive of a significant relationship between weight growth percentile and hypothyroidism (p-value= 0.3879, X-squared= 0.7455, df= 1). Likewise, this test did not indicate a significant correlation between hypothyroidism and height growth percentile.

Distribution of weight and height growth percentiles for both hypothyroidism and non-hypothyroidism groups is provided in the lower part of diagram 1.

Table 1- frequency distribution of subclinical hypothyroidism in children under study in terms of their age group

Total	Hypothyroidism			
	Yes	No		
(% 61/2) 115	20 (% 10/7)	95 (% 50/5)	2-10 years old	Age
(% 38/8) 73	5 (% 2/6)	68 (% 36/2)	10-18 years old	
(100%) 188	25 (% 13/3)	163 (% 86/7)	Total	

Table 2- frequency distribution of subclinical hypothyroidism in children under study in terms of their gender

Total	Hypothyroidism			
	Yes	No		
83 (%/44/1)	13 (6%/9)	70 (% 37/2)	Male	Gender
105 (% 55/9)	12 (% 6/4)	93 (%/49/5)	Female	
188 (100%)	25 (% 13/3)	163 (% 86/7)	Total	

Table 3- frequency distribution of subclinical hypothyroidism in children under study in terms of their weight and height growth percentiles

Hypothyroidism based on height growth percentile		Hypothyroidism based on weight growth percentile			Percentile
%	Frequency	%	frequency		
13/5	10	16/3	14	Yes	Less than 5
86/5	64	83/7	72	No	
100	74	100	86	Total	
13/3	15	10/9	11	Yes	More than 5
86/7	98	89/1	90	No	
100	113	100	101	Total	

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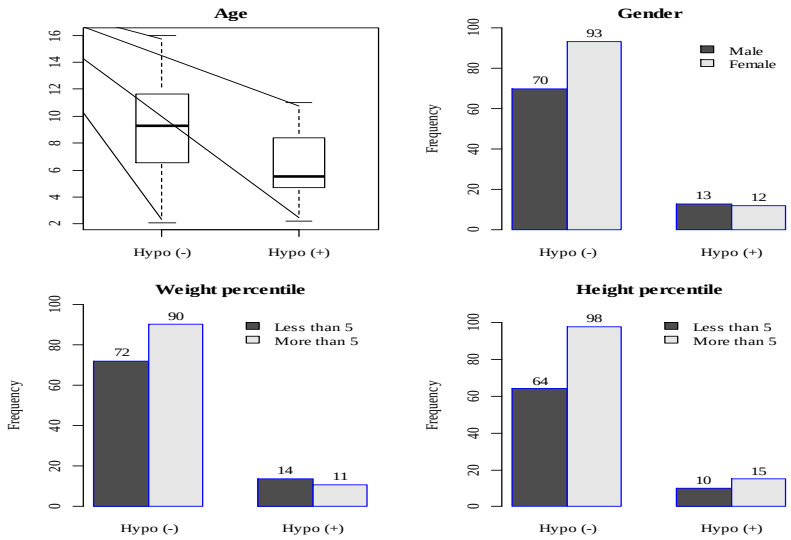

Diagram 1- age and gender distributions and height and weight growth percentiles in both subclinical hypothyroidism and non-hypothyroidism children

DISCUSSION AND CONCLUSIONS

Surveys on valid databases suggests a scant number of studies concerning the relationship between subclinical hypothyroidism, growth indicators and the related problems. Therefore, regarding the necessity of more studies to this respect, subclinical hypothyroidism and its effects on children's growth was investigated and the results indicated that prevalence of subclinical hypothyroidism among children referring to Besat medical education and treatment clinic was 13.3%, indicating lack of this disorder in them. Children with the highest degree of hypothyroidism were in the age range of 2-10 years old. In an almost similar study, Leonardi et al, followed 44 children out of 56 children who were investigated in terms of SCH among whom 50% had this disorder with an average age of 5.3 years old [1-6,13,14]. In another study, Wasniewska et al, conducted a prospective investigation of 92 children with subclinical hypothyroidism with unknown causes and an average age of 8.1±3 whose results were inconsistent with this study [15].

Studies demonstrate that diagnosis of this disorder in children under 10 years old takes place easier and in higher ages, its prevalence in children with growth disorders becomes similar to that in public population. According to the guidelines of European Thyroid Association (2014), SCH and isolated hypothyroxinemia are completely correlated with children neural-mental disorder. SCH in children (TSH>5.5-10 mU/I) occurs in more than 70% of cases and persists as of five successive years in the majority of patients, however, it doesn't get worse. There is no study concerning the effects of SCH on neuropsychological conditions in children under 3 years old and its treatment and the evidence indicating the existence of a relationship between this disorder and lack of neuropsychological growth in older children are contradictory [2]. A study conducted by Torun et al, also indicated a hypothyroidism prevalence with the range of 2-14 years old that was consistent with our research [16].

The results suggested that the number of female children referring to this clinic was larger than that of male children, however, subclinical hypothyroidism was more prevalent in male patients.To this respect, in the study performed by Hashemipour et al, in 760 children under study, congenital hypothyroidism was more prevalent in male children [4]. In a different study by Zeynalzadeh et al. that compared anthropometric indices in children suffering from CH and the newcomers to schools, of 33 children under study, male children allocated a larger number to themselves [5].

The results of current study suggested that along with getting information about prevalence of SCH in children in terms of demographic variables, a larger number of these children had a weight growth percentile more than 5; however, prevalence of subclinical hypothyroidism was higher in the weight percentile less than 5 and this percentile was known as a growth disorder. In a similar study, Cerbone et al, who investigated the relationship between weight indicators and BMI in children with persistent SCH concluded that only 8% of

those children were obese and there was no significant and noticeable changes in weight and BMI during diagnosis to conducting the subsequent studies [17]. Cumar in his study divided 50 children into two groups of obese and overweight and studied TSH level and hypothyroidism concluding that the degree of obesity does not significantly affect TSH level [18].

Most of children under study had a height growth percentile higher than 5 but the largest prevalence of SCH was in height growth percentile under 5. In a similar study, Cerbone studied growth rate in children with SCH. Indicators related to height and bone age were natural in the inception of the study and didn't change over the follow-up surveys. Despite an average natural height, one group of children (22%) with SCH were dwarfish (20). Di Mase et al., studied possible effects of SCH on bone health in children and obtained a natural height in children in spite of persistency of SCH [19].

High prevalence of SCH in children with height and weight growth disorder suggests that there is a correlation between growth disorder and hypothyroidism. Studies on family history, as another case of study, indicated that none of family members had a history of hypothyroidism [17].

The results of current work indicated that SCH in children who complain about insufficient growth disorder was higher compared to public population. Moreover, prevalence of SCH in children with weight growth disorder was higher than in those with height growth disorder. Likewise, prevalence of SCH in children older than 10 who complained about growth disorder was the same as in public population. This study lacked any specific limitations. The findings of current work suggest that more favorable results in children's growth may be obtained through early diagnosis of SCH and its appropriate treatment. It is recommended that future research consider the effects of factors investigated here on mental performance of children with subclinical hypothyroidism.

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