Valley International Journals
Open Access Journal

International Journal Of Medical Science And Clinical Inventions
Volume3 issue 12 2016 page no. 2461-2466 e-ISSN: 2348-991X p-ISSN: 2454-9576
AvailableOnlineAt:http://valleyinternational.net/index.php/our-jou/ijmsci

Clinical Study of Hypothyroidism in Children

Dr. Vijay C. Nakum[1], Dr. Purvi S. Patel[2], Dr. K. M. Mehariya[3]
[1]Resident Doctor
[2]Assistant Professor
[3]Professisor And Head Of The Department
Department of Pediatrics, B. J. Medical College, Civil Hospital, Ahmedabad.

Abstract:
INTRODUCTION: Hypothyroidism is a common disorder of the endocrine system in which the thyroid gland does not produce enough thyroid hormone
AIMS AND OBJECTIVES: To study aetiology, epidemiological parameters and clinical profile of hypothyroidism in children up to 12 years of age presenting at tertiary care hospital.
DESIGN OF STUDY: Prospective Analytic study done at Department of Paediatrics, B J Medical College, Ahmedabad From 1st September 2015 To 31st August 2016.
RESULTS: In this study the thyroid dysfunction has a peak in infancy. Hypothyroidism is more common in females (62%) as compares to male (38%) and male:female ratio is 1:1.6. Out of 55 cases 32.7% were under nutrition, 12.7% had over weight and 54.5% had normal weight and stunting found in 17(30.9%) cases. Lethargy(63%) being more common symptoms followed by developmental delay(55%). Non pitting oedema (47%) was most common sign followed by delayed closure of anterior fontanelle. Congenital hypothyroidism (62%) being most common type. The mean T3, T4 and TSH levels in our study of hypothyroids was 38.06 µg/ dl, 2.72µg/dl and 62.4µu/ml respectively. On thyroid scan thyromegaly is most common observed (33.3%).
CONCLUSION: From this study we can find the current scenario of hypothyroidism in paediatrics patients and find that the congenital hypothyroidism is the most common cause which present in early infancy. By early diagnosis and treatment, we can give a better life to our patient.

KEY POINTS: Hypothyroidism, overweight, stunting, developmental delay, thyromegaly.

I. INTRODUCTION

Among endocrine disorders most commonly encountered in the pediatric age group, disorders of the thyroid gland are most frequent with hypothyroidism being the commonest. Goitre (thyromegaly) with or without alterations in thyroid function is not uncommon but hyperthyroidism is less frequent. The most pronounced effect of thyroid dysfunction in this age group is on growth and development but it also leads to metabolic abnormalities similar to those in adults.[1]

Hypothyroidism i.e. deficiency of the thyroid hormones produces a number of clinical manifestations depending upon the degree of deficiency. Absence or incomplete development of the thyroid gland can cause cretinism, characterized by a low Basal metabolic rate, retardation of mental and physical development, constipation, edema, dry skin, goiter etc.

Causes of hypothyroidism could be any of the following 3:

Deficiency of TRH, TSH, Primary deficiency of thyroid hormones can occur with congenital aplasia, hypoplasia or ectopia of the thyroid gland, defective synthesis of thyroid hormones associated with iodide trapping defect, iodide organification defect, iodotyrosine coupling

DOI:10.18535/ijmsci/v3i12.10

defect, thyroglobulin, synthesis defect, iodine deficiency, damage to the thyroid gland by autoimmune disease, cystinosis, iatrogenic drugs, thyroidectomy, neck irradiation etc..

Neonatal hypothyroidism is the 2 most important treatable cause of mental retardation at an early age. Early detection and prompt treatment with thyroid hormone of neonatal hypothyroidism has been clearly shown to salvage the normal brain function. It is also shown that later the initiation of treatment after birth the greater the mental changes. Thus, early neonatal screening for detection of congenital hypothyroidism represents one of the major contributions to health care throughout the world. The prompt treatment of neonatal hypothyroidism at birth prevents the dismal permanent mental and physical impairment like deaf mutism, myxedema, mental retardation and cretinism etc.[2, 3]

Chatin[4,5] in 1820 proved that iodine is relatively deficient in areas of endemic goitre. Thus the role of iodine in thyroid metabolism has evolved over years and we know that iodine is essential for the formation of thyroid hormone and deficiency of it can cause goitre. Congenital hypothyroidism can occur in endemically iodine deficient area with a goitre. This forms one of the major causes of congenital hypothyroidism. The incidence of neonatal hypothyroidism in iodine deficient area is 15%.[6]

Approximately 100 mg of thyroxine (T4) is secreted by the thyroid gland daily and about 90 mg of iodide (15 mg/kg) is the recommended daily intake during infancy and childhood with higher requirements in preterms.[1]

II. OBSERVATION AND ANALYSIS

Table-1 Age Of Cases And Age Of Diagnosis Of Cases (N=55)

Age	*Age at present*	*Age of diagnosis*
0-1 year	22(40%)	29(52%)
1-3 year	8(14%)	9(16%)
4-6 year	7(12%)	5(9%)
7-9 year	11(20%)	9(16%)

Maximum numbers of cases were in 0-1 year of age

Table-2 Sex Distribution Of Total Cases (N=55)

Age	*Male*	*Female*
0-1 year	9	13
1-3 year	5	3
4-6 year	2	5
7-9 year	2	9
10-12 year	3	4
Total	21(38%)	34(62%)

Out of total 55 hypothyroid cases 21 were male and 34 were female. Overall male to female ratio was 1:1.6.

Table-3 Type Of Hypothyroidism In Cases (N=55)

Type of hypothyroidism	*Cases*
Goitrous	5 (9%)
Non goitrous	50 (91%)

Out of total 55 cases that were studied 9% were goitrous and 91% were non goitrous.

Table-3 Weight Distribution Of Hypothyroid Cases (N=55)

Age	*under nutrition*	*Normal weight*	*Over weight*	*Total*
0-1 years	8	12	2	22(40%)
1-3 years	2	5	1	8(14%)
4-6 years	3	2	2	7(12%)
7-9 years	2	8	1	11(20%)
10-12 years	3	3	1	7(12%)
Total	18 (32.7%)	30 (54.5%)	7 (12.7%)	55

This table shows distribution of weight in hypothyroid cases. Out of 55 cases 32.7% were under nutrition, 12.7% had over weight and 54.5% had normal weight. Maximum numbers of overweight were in 0-1 years of age group.

DOI:10.18535/ijmsci/v3i12.10

Table-4 Height Distribution In Hypothyroid Cases (N=55)

Age	*Stunting*	*Normal height*	*Total*
0-1 years	4	18	22(40%)
1-3 years	2	6	8(14%)
4-6 years	3	4	7(12%)
7-9 years	5	6	11(20%)
10-12 years	3	4	7(12%)
Total	17(30.9%)	38(69%)	55

Above table shows distribution of height in hypothyroid patients. 30.9% cases had stunting whereas 69% had normal height. Maximum number of cases had stunting were in age group 7-9 years, where maximum with normal height were in 0-1 year of age group.

Table-5 Symptoms Of Hypothyroid Patients (N=55)

Symptoms	*Number of cases*
Lethargy	35 (63%)
Developmental delay	30 (55%)
Feeding difficulties	28(50%)
Delayed closure of anterior fontanelle	21(38%)
Edema	20(36%)
Dry skin	19(34.5%)
Constipation	17 (30.9%)
Prolonged physiological jaundice	14(25.4%)
Change in voice	12(21.8%)
Umbilical swelling	10(18%)
Swelling in neck	5(9%)
Respiratory difficulties	5(9%)

Most of the hypothyroid patients had lethargy as common symptom (63%) followed by developmental delay (55%), Feeding difficulties (50%) and delayed closure of anterior fontanelle (38%)

Table-6 Signs Of Hypothyroid (N=55)

Signs	*Number Of Cases*
Non Pitting Edema	26(47%)
Delayed Closure Of Anterior Fontanelle	21(38%)
Pallor	19(34.5%)
Dry Skin	19(34%)
Coarse Facies	18 (32%)
Slow Relaxation Of Deep Tendon Jerks	14(25.4%)
Bradycardia	9(16.3%)
Noisy Respiration	5(9%)
Prolonged Neonatal Jaundice	4(7%)

47% of hypothyroid patients had non pitting edema followed by delayed closure of anterior fontanelle followed by pallor (34.5%), dry skin (34%), coarse facies (32%) and slow relaxation of deep tendon jerks (25.4%).

Table-7 Co-Morbidities(N=55)

Co-Morbidity	*Number of patient*
Down's syndrome	5
Congenital heart disease	3
Birth asphyxia	2
Neonatal cholestasis	2
Cerebral palsy	2
Diabetes mellitus	1
Thalassemia	1
Portal hypertension	1

The table suggests associated anomalies or co-morbidities in which maximum co-morbidity present was Down's syndrome. Other morbidities may be due by chance association.

DOI:10.18535/ijmsci/v3i12.10

Table-8 Etiology Of Thyroid Dysfunction

Etiology	Number of cases
Congenital hypothyroidism	34(62%)
Acquired hypothyroidism	21(38%)
Juvenile hypothyroidism	5(9%)
Autoimmune thyroiditis	3(5%)
Transient neonatal hypothyroidism	3(5%)

The above table shows that majority were congenital hypothyroidism (62%) followed by acquired hypothyroidism (38%) followed by juvenile hypothyroidism(9%).

Table-9 Dosage Of Levothyroxin

Starting dose	*Number of patients*
10-15 µg/kg/day	34(62%)
8-12 µg/kg/day	3(5%)
6-8 µg/kg/day	5(9%)
4 µg/kg/day	13(23.6%)

All congenital hypothyroidism patients(62%) were started on the dose of 10-15 µg/kg/day while 23.6% patients were started on 4 µg/kg/day of thyroxin.

Table-10 Laboratory Investigations (T3, T4 And TSH) (N=55)

Age (years)	*Numbers*	*T3ng/dl (mean)*	*T4 ug/dl (mean)*	*TSH mu/ml (mean)*
Normal Ranges		75-210	5.5-13.5	0.7-6.4
0-1	22(40%)	32.2	4.2	87
1-3	8(14%)	62	3.6	63
4-6	7(12%)	43.5	2.4	60
7-9	11(20%)	31.6	2.2	52
10-12	7(12%)	21	1.2	50
Total	55	38.06	2.72	62.4

The above table shows mean thyroid levels and TSH. The mean TSH level was 62.4, mean T_3 was 38.06 and mean T_4 was 2.68.

Table-11 Bone Age(N=55)

Bone age	*Male*	*Female*	*Total*
Delayed	14	24	38(69%)
Normal	7	10	17((31%)
Total	21	34	55

Above table suggest that 69% of patients had delayed bone age while 31% of patients had normal bone age.

Table-12 Thyroid Scan(N=46)

Thyroid scan report	*No. of cases*
Thyromegaly	10(33.3%)
Normal uptake	8(26.6%)
Dyshormonogenesis	6(20%)
Good trapping function	3(10%)
Ectopic thyroid tissue	2(6%)
Increased trapping function	1(3%)

33.3% of patients have thyromegaly while 26.6% of patients have normal thyroid scan while 20% of patients have dyshormogenesis

III. DISCUSSION

Approximately 1/3rd of hypothyroids present in infancy and 2/3rds in childhood[7] but with increased suspicion and availability of thyroid function test more cases are being identified in infancy. In our study approx 40 % were from infancy age group while rest presented later.

In our study there were 55 patients of hypothyroids, of these 34 were females and male 21, the Female:male ratio being 1.6:1. The higher incidence of hypothyroidism, for that matter all thyroid disorders, in females is very well known. Watanakunakorn and associates[8] in their study of 400 patients of myxedema showed a ratio of 4.79:1 of Female:Male.

Congenital hypothyroidism especially of a milder variety, needs very high degree of suspicion to diagnose and so may present later on in life with

DOI:10.18535/ijmsci/v3i12.10

frank signs and symptoms of hypothyroidism. Parent's literacy also had a positive impact on early diagnosis due to early consultation. The other cause is acquired hypothyroidism: lymphocytic thyroiditis being the commonest.

Abbassi and associates[9] in their study of juvenile hypothyroidism in 19 patients showed 8 having chronic lymphocytic thyroiditis. Watson Buchanan[10] studied 71 patients of primary hypothyroidism and showed than 70% i.e. 50 patients had Hashimoto's thyroditis. In our study out of 5(9%) cases of juvenile hypothyroidism 3(60%) were of autoimmune thyroiditis, which correlates well with other studies.

The serum concentration of T4 is 50 to 100 times higher than that of T3 and the concentrations of the both are relatively constant in steady state. But T3 though being less in blood its action is 3-4 times more the T4.

T4 under normal circumstances is the secretory product of the thyroid gland and is now regarded largely as a prohormone as at least 85% of its biological activity can be attributed to T3 derived from it.

The earliest change with thyroid hyperfunction is a reduction in T4 synthesis and release. As the serum T4 begins to fall the pituitary releases more TSH. The high level of TSH stimulates the thyroid gland and the ratio of T3 to T4 thyroidal secretion increases. In presence of decreased thyroid reserve of absolute or relative iodine deficiency a euthyroid status is maintained by a preferential secretion of T3 over T4. This means there is a shift in the Predominant source of T3 from extrathyroidal T4 5-deiodination toward direct secretion of T3 by the thyroid.43

The mean T3, T4 and TSH levels in our study of hypothyroids was 38.06 µg/ dl, 2.72µg/dl and 62.4µu/ml respectively. Meena Desai et al[11] in their study showed T3, T4 and TSH, of hypothyroid children, as 21.39± 2.95 ng/dl, 1.2585 ± 0.15922µg/dl and 1380.87 ± 440.731µu/ml. It showed a maximum of more than 333 of TSH in 16 of her patients.

Abbassi[9] had a range of T4 from 0.3 to 4.9 µg/dl which correlated well with our study of 2.4 µg/ dl. We found that the upper limits of T3 values in hypothyroids are closer to the lower range of normal as compared to T4. T4 and TSH are more useful therefore in confirming primary hypothyroid state and TSH is discriminatory in the diagnosis of primary hypothyroidism.

IV. CONCLUSION AND SUMMARY

To summarize 55 children were studied for hypothyroidism and T3, T4 and TSH profile was done because they had signs and symptoms of hypothyroidism and thyroid function tests was suggestive of thyroid disorder.

In this study the thyroid dysfunction has a peak in infancy. Hypothyroidism is more common in females (62%) as compares to male (38%) and male:female ratio of 1:1.6. The higher incidence of hypothyroidism, for that matter all thyroid disorders, in females is very well known.

Out of 55 cases 12.7% were under nutrition, 32.7% had over weight and 54.5% had normal weight and stunting found in 17(30.9%) cases.

Lethargy(63%) being more common symptoms followed by developmental delay(55%) followed by feeding difficulties(50%), delayed closure of anterior fontanelle(38%), edema(36%), dry skin(34.5%), constipation(30.9%) and prolonged physiological jaundice(25.4%).

Non pitting edema (47%) was most common sign followed by delayed closure of anterior fontanelle followed by pallor(34.5%), dry skin(34%), Coarse facies(32%) and slow relaxation of deep tendon jerks(25.4%).

Congenital hypothyroidism (62%) being most common than acquired hypothyroidism(38%). In most patient starting dose of levothyroxine 10-15 µg/kg/day.

The mean T3, T4 and TSH levels in our study of hypothyroids was 38.06 µg/ dl, 2.72µg/dl and 62.4µu/ml respectively. Their levels shows a gradual decrease in concentrations of T4 from 1 year to 12 years. The mean T4 level at 0-1 year of ages was 4.2 µg/dl and at 10-12 years was 1.2 µg/ dl.

Serum T4 and TSH appear more helpful in Establishing the diagnosis of primary hypothyrodism because of the occasional overlap of T3 and reverse T3 values in normals. Congenital hypothyrodism is an old disease which

DOI:10.18535/ijmsci/v3i12.10

has raised many queries with the availability of never diagnostic techniques.

Radioimmunological evaluation of thyroid hormones has made the confirmation of clinically doubtful disease possible with the added prospect or early replacement.

V. REFERENCES

[1] Desai MP, Thyroid Function in Children, Supplement to JAPI, January 2011, Vol 59.

[2] Klien AH, Meltzer S, Kenny FM. Improved prognosis in congenital hypothyroidism treated before age three months. J Pediatr 1972;81:912-5 Manual of Endocrinology and Metabolism - Page 459 Norman Lavin - 2009 , aims nicu protocol 2008

[3] LaFranchi SH, Austin J. How should we be treating children Wlth congenital hypothyroidism? J Pediatr Endocrinol Metab 2007. , 20:559-78.

[4] Fisher DA, Disorders of the thyroid in newborns and Infants. In Sperling MA, ed. Pediatric Endocrinology, 2nd edition, Philadelphia: Saunders, 2002; Emedicine.medscape.com/article/835535/- overview, Nuclear medicine in vivo, Benjamin rothfield, lippincot, 1983

[5] Volpe Robert, The thyroid systemic endocrinology, calvin Ezrin, John O Godden (eds) 1973, Hagestown, Harper and Row publications, N.Y.,55-94.

[6] Desai MP, Colaco MP, Ajgaonkar AP et al. Screening for hypothyroidism, Indian Paediatrics 1984 , 21 : 695-700. Brown RS. The thyroid gland. In Brook CGD, Hindmarsh PC eds. Clinical Pediatric Endocrinology, 4th edition. London: Blackwell Science, 2001;288-320.

[7] La Franchi SH - Hypothyroidism, Pediatric Clinics of North America, Solomon A Kaplan 1979, 26 : 33-51.

[8] Chatrchai watanakunakorn, Hodges RE, Myxedema - A study of 400 cases, Arch. Intern. Med. 1965, 116 : 183-190.

[9] Abbasai V. Rigternik E, Clinical recognition of Juvenile hypothyroidism in early atage. Clinical pediatr. (Phila) 1980, 19 : 782-786.

[10] Watson Buchanan, Macharden, Rohald. Primary hypothyroidism and Hashimoto's thyroidistis, Arch. Intrn. Med. 1965, 115 : 411-415.

[11] Meena Desai, Colaco MP, Iran AJ : Thyroid hormones and TSH in normal children and hypothyroids. Indian pediatrics 1983, 20 : 11-19.

DOI:10.18535/ijmsci/v3i12.10