URINE IODINE, THE THYROID STATUS AND PHYSICAL GROWTH INCHILDREN UNDER 2 YEARS OF AGE IN IDD ENDEMIC AREAS OF SRUMBUNG MAGELANG

Zulkhah Noor[1], Anindhita Mega Praningwestri[2], Bambang Edi Susyanto[3]

[1] Department of Physiology, Faculty of Medicine and Health Science, Universitas Muhammadiyah Yogyakarta, zulkhah.noor@umy.ac.id

[2] undergraduate students Faculty of Medicine and Health Science, Universitas Muhammadiyah Yogyakarta,

[3] Department of paediatric, Faculty of Medicine and Health Science, Universitas Muhammadiyah Yogyakarta

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Introduction

People living in areas with low soil iodine levels and high goitrogens, they are at risk of iodine deficiency disorders (IDD). If IDD occurs in pregnant women, so children born will have congenital hypothyroidism (CH) (Djokomulyanto, 2009). Thyroid hormone is needed for energy metabolism and growth How thyroid hormone or thyroid stimulating hormone (TSH) abnormalities affect the physiology and molecular characteristics, and metabolic disorders of bone is still controversial. Monitoring of thyroid function and thyroid hormone replacement therapy since early childhood in endemic areas needed to improve the growth and development of children with thyroid dysfunction (Kowalczyk, 2013).

Objective

This study aims to determine the median urinary iodine levels, TSH and fT_4. To determine the correlation between fT_4 and physical growth of children under 2 years of age in IDD endemic areas of Srumbung, Magelang

Methods

This research design is observational. Data measured by cross sectional. This research sample was 43 people. That number is the total mothers and children under 2 years old are from Ngargosoka Srumbung Magelang willing to become respondents. The study was conducted in March until June 2013. The method used was observational and cross-sectional data retrieved. Mother urine iodine levels were measured in the laboratory GAKI Borobudur Magelang Indonesia. Levels of serum TSH and free T4 were measured by ELISA (AIM fT4 and TSH ELISA TEST (PT Intan Accurate Madya). Physical growth include weight, height, head circumference, and upper arm circumference. Weight measured in kilograms (kg), followed by calculation of BMI. Upper arm circumference were measured using standard Wolanski. Data were analyzed with the Pearson correlation test for normal data and Spearman correlation for the data is not normal.

Result

Table 1. Overview status of urinary iodine, TSH and fT_4 serum in children under 2 years of age who live in Ngargosoko Village , Srumbung, Magelang

Criteria	n	Urinary iodine level (ug/L)	Serum fT_4 level (ng/dL)	Serum TSH level (μIU/ml)
lowest levels	-	41	0,383	0.26
highest levels	-	503	1,793	7.01
Median	43	296	0.792	1.5
mean	43	301.7209	0.8545	1.7187
Standart Deviation	43	114.6584	0.30591	1.35884

Table 2. Distribution of Frequency of ChildrenWeight Category based on fT_4 Status

No	fT4 Status	Children weight						Spearman corelation test
		good		Less good		bad		
		n	%	n	%	n	%	
1	low	19	44,1	3	6,9	1	2,3	p = 0,004 r = 0,426
2	Optimum	19	44,1	1	2,3	0	0	
	Total	38	88,3	4	9,3	1	2,3	

Table 3. Distribution of Frequency of Length for children category based on the status of the fT_4

N0	fT4 Status	the length of the child				Spearman corelation test
		the length of the child		Normal		
		N	%	n	%	
1	low	11	25,53	12	27,9	p=0,011 r=0,397
2	Optimum	3	6,9	17	39,5	
	Total	14	32,5	29	67,4	

Table 4. Distribution of Frequency of Head Circumference category based on fT_4 Status

No	fT4 Status	Head Circumference						Spearman corelation test
		Percentil <5th		Percentil 5th – 95th		Percentil >95th		
		n	%	n	%	N	%	
1	low	2	4,6	18	41,8	1	2,3	p= 0,309 r= 0,056
2	Optimum	0	0	18	41,8	0	0	
	Total	2	4,6	36	83,7	1	2,3	

Table 5. Distribution of Frequency of upper arm Circumference categori based on fT_4 Status

No	fT4 Status	upper arm circumference						Spearman corelation test
		Percentil <5th		Percentil 85th – 95th		Percentil >95th		
		n	%	n	%	n	%	
1	low	2	2,3	12	27,9	4	9,3	p = 0,041 r = -0,342
2	Optimum	0	0	13	30,2	4	9,3	
	Total*	2	2,3	25	58,1	8	18,6	

Ngargosoko Srumbung Magelang currently have adequate iodine intake with a median urinary iodine concentration of 296 ug / dL, mean blood levels of TSH and fT_4 respectively is 1.7187 μIU / mL and 0.8545 ng / dL. But still obtained at 50.84% of respondents hypothyroidism.

Thyroid status significantly correlated with body weight (p = 0,004, r = 0,426), body length (p=0,011, r=0,397) and circumference of the upper arm (p = 0,041, r = -0,342)

Discussion

- Anthropometric measurements found children with growth disorders are more common in the group of low FT4. Growth disorders include malnutrition, short, skinny posture once or obese and overweight posture as well as the tendency of development disorders because of the size of the circumference of the head is not normal
- Thyroid hormones play an important role in bone growth after birth. Thyroid hormones act by influencing the formation and remodeling of bone during growth. (Gogakos al, 2010). Thyroid hormones reduce circulating lipoproteins such as Apo B-48. This shows that the higher the levels of fT4 will reduce levels of excess fat in the body (Mitsuru, 2013)
- Results showed that there were 3 children with head circumference <5th percentile and> 95th percentile and three is a child with low FT4 status. Measurement of the head circumference is an evaluation of the most simple, basic, and inexpensive to be done to estimate the development of the central nervous system in neonates who are at high risk of impaired brain development (Garcia-Alix, 2004). According to WHO data interpretation percentile, then the three children will be impaired mental development

Conclutions

•Ngargosoka Srumbung Magelang still an IDD endemic area.
•Free thyroxine blood levels determine body weight, body length and the nutritional status of children under the age of 2 years

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