



2nd ICHMS & 2nd LSC

PROCEEDING

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The 2nd International Conference of Medical and Health Sciences (ICMHS) and The 2nd Life Sciences Conference (LSC) 2016

*"Towards a Better Quality of Life
through Interdisciplinary Research"*

Yogyakarta, 9th-10th December 2016
The Alana Hotel and Convention Center

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**The 2nd International Conference of Medical & Health Sciences
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**Chair person of The 2nd International Conference of Medical and
Health Sciences and The 2nd Life Sciences Conference 2016**



Welcome to Jogja, sugeng rawuh!

For the second time, the Faculty of Medicine and Health Sciences Universitas Muhammadiyah Yogyakarta is going to conduct the 2nd International Conference of Medical and Health Sciences (ICMHS) this December in vibrant Yogyakarta, Indonesia. This year we are going to collaborate with the Life Sciences Society of Pakistan for their 2nd Life Sciences Conference (LSC) with Dr. Zahid Iqbal as the general secretary.

This year's conference theme "Towards a better quality of life through interdisciplinary research" will be celebrating an era of seamless interdisciplinary integration and collaboration in scientific innovations with the involvement of more extensive topics and disciplines in the conference. We aim to exhibit the products of that kind of approach in solving challenges, improving the quality of life, and creating sustainable developments. We are happy to announce that our conference is filled with Invited speakers from Pakistan, United States of America, Uni Emirates Arab, Malaysia and Indonesia. Presentations will be conducted in oral as well as poster that covers topics from medicine, public health, dentistry, pharmacy, biomedical to agriculture. To put more credibility to the conference we are collaborating with Isra Medical Journal and the Asian Journal of Agriculture and Biology to publish selected papers from the event. Other paper will be published in the ISBN Proceeding book.

The last but not least, enjoy the conference, start networking and sharing ideas, and let immerse yourself to the heritage cultural ambient of Jogja, sumonggo!

Yogyakarta, 1st December 2016

dr. Iman Permana, M.Kes, Ph.D.

**The 2nd International Conference of Medical & Health Sciences
and
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**Dean of Faculty of Medicine and Health Sciences,
Universitas Muhammadiyah Yogyakarta**



Assalamu'alaikum Wr. Wb.

Science, especially in the areas of health and life growing more rapidly. We need to work together in the research of various disciplines to the advancement of science and to provide benefits to human life.

After successfully organized international scientific meeting last year, the Faculty of Medical and Health Sciences Universitas Muhammadiyah Yogyakarta, held the second scientific meeting ICMHS along with "2nd Life Sciences Conference". In this second scientific meeting, FKIK UMY collaborates with various researchers, among others from Pakistan, Malaysia, and the United States. Taking the theme "Towards a better quality of life through interdisciplinary research" we hope to establish cooperation with various parties to be able to contribute ideas to the civilization of human life.

Finally, we congratulate the scientific meeting in the city of Yogyakarta Indonesia. Enjoy the beautiful city of Yogyakarta with priceless historical relics. We hope that this meeting can run smoothly and provide benefits to the advancement of knowledge.

Wassalamu'alaikum Wr. Wb.

Yogyakarta, 1st December 2016

dr. Ardi Pramono, M.Kes, Sp.An.

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and
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Rector of Universitas Muhammadiyah Yogyakarta



Assalaamu'alaikum Wr. Wb.

Ladies and Gentlemen,

Welcome to the 2nd International Conference on Medical and Health Science in conjunction with the 2nd Life Sciences Conference 2016

Welcome to Yogyakarta City of Tolerance

Our Faculty of Medicine and Health Sciences has been doing such international conference almost every year for the last ten years. This and other previous conferences are the things that supporting our vision as an excellence and Islamic university, a young and global university. We will always try to keep monitoring the development of science through sending more lecturers to do the sabbatical leave overseas, doing international research collaborations and also the international conference. Each department should do this strategy of internationalization so that each department has its own network. Faculty of medicine and health science is one of the most progressive units in implementing this strategy by inviting international experts on a regular basis. This program will certainly strengthen our vision.

International conference on medicine and health sciences is a smart choice to offer our lecturers access to the most recent development of the subjects. The participants will also gain the same knowledge and latest information on medicine and health sciences. As everyone knows that the development of science and technology are faster today compared to the previous period. Information technology, computer, and other development havefastened the transformation of medicine and health science into the different and more complex stage.

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Cellular technology, for instance, can be used for several functions including those that directly impacts our daily life. There is no long distance call anymore today because cellular phone can do everything we need to contact other people far from where we stand anytime anywhere. People will finally innovate cellular phone for the sake of personal health services. We will in the future using our simple cellular phone to detect our body temperature, blood pressure, even how much fat we have in our body and how much it is supposed to be. We may also be able to check the health of our body without leaving our house and order medicine without going into the drug store. Everything is almost possible as long as we think hard for the better of people in the future. Enjoy the conference and don't forget to visit our rich tourist destinations, mountains, beaches or caves (underground waterways).

Thank you

Wassalaamu'alaikum Wr. Wb.

Prof. Dr. Bambang Cipto, MA

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Keynote Speech

**by Head of Provincial Health Office Special Region of Yogyakarta
in International Conference
of Medical and Health Sciences and Life Sciences Conference**

The Alana Hotel and Convention Center, Yogyakarta, December 9-10, 2016

The honorable:

- Rector of Muhammadiyah University of Yogyakarta,
- The Dean of Medical and Health Sciences Muhammadiyah University of Yogyakarta,
- The chairman of organizing committee of the international conference of medical and health,
- Distinguished guests and colleagues.

Assalamu'alaikum Warahmatullahi Wabarakatuh,

First of all, we thank God for His blessings that today we may attend the International Conference of Medical Health Towards a Better Quality of Life Through Interdisciplinary Research in Yogyakarta.

My distinguished colleagues,

In Indonesia National Long Term Development Plan (2005-2024), the Indonesian Ministry of Health have determined a paradigm shift that have governed health services in health development plan. There has been a shift from Curative Health Services to Preventive and Promotive Health Services.

Recently, Indonesia suffers from a triple burden of diseases as health development challenges. The triple burden of diseases are: 1) the backlog of common infections, undernutrition, and maternal mortality; 2) the emerging challenges of non-communicable diseases (NCDs), such as cancer, diabetes, heart disease; and 3) mental illness, and the problems directly related to globalization, like pandemics and the health consequences of climate change.

Dear colleagues,

Here are some data that show several health problems in Indonesia:

1. Maternal mortality rate in 2015 is 4,809 cases, infant mortality rate in 2015 is 22,267 cases;
2. Regarding to children under the age of five, the national stunting rate is 37.2% which consists of 18% for very short dan 19.2% for short (Riskesdas 2013);

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3. HIV testing coverage is 14% dan antiretroviral (ARV) therapy coverage is 65.58% (Directorate General of Disease Control and Prevention Ministry of Health, 2015);
4. Tuberculosis (TB) notification rate in 2015 is 73.5% and tuberculosis treatment success rate is 72% (Directorate General of Disease Control and Prevention Ministry of Health, 2015).

Distinguished guests,

Indonesia Health Development Program in 2015-2019 strengths in improving human quality life through Health Indonesia Program with family approach. The Indonesian Ministry of Health issued The Minister of Health Regulation (Permenkes) No. 39 Year 2016 as a Guideline of Implementation of Health Indonesia Program with Family Approach. This program has 12 main indicators as markers of a family health status. Currently, many health programs have been implemented by Indonesian Ministry of Health, Provincial Health Offices, and District Health Offices. However, many health problems, some as mentioned above, still become health burdens. We may ask a question whether the programs that we conducted have answered the health problems we have in Indonesia.

It would be better if all health programs that we implement based on scientific health research, especially interdisciplinary research. The research should be related to detection, prevention, and treatment of diseases or problem solving for better health.

My dear colleagues,

Being a province with speciality, Special Region of Yogyakarta placed Traditional Medicine as one of the priority programs in Provincial Medium Term Development Plan (2017-2022). We still encounter many challenges in developing Traditional Medicine, especially in providing services which are based on scientific evidence.

Distinguished colleagues,

We look forward to results of interdisciplinary research which would support health problem solving, especially by developing traditional medicine in Yogyakarta. We believe that collaboration in interdisciplinary research would improve quality of human life.

Finally,

Thank you for your attention. We wish you a successful conference.

Wassalamu'alaikum Warahmatullahi Wabarakatuh,

On behalf of
the Head of Provincial Health Office
Special Region of Yogyakarta

Drg. Pembajun Setyaningastutie, M.Kes

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**SPEAKER OF
INTERNATIONAL CONFERENCE**

Zahid Iqbal

Al-Nafees Medical College Isra University Islamabad Campus Islamabad, Pakistan
“One Health Program for Public Health Benefit”

Prof. Dr. Abdul Khaliq

Professor, Department of Agronomy, University of Agriculture, Faisalabad
“Role of Agriculture in Poverty Alleviation of Rural Areas”

Fitri Arofati

Universitas Muhammadiyah Yogyakarta, Indonesia
“Continuing Professional Development of Practicing Nurses in Indonesia”

Tri Wahyuliati

Universitas Muhammadiyah Yogyakarta, Indonesia
“Diabetic Neuropathy - A Chance Towards A Better Treatment”

Mohammad Khalid Ashfaq

University of Mississippi, USA
“Natural Products –Use or Misuse”

Muhammad Mukhtar

American University of Ras Al Khaimah, United Arab Emirates
“Emerging Biotechnologies and Genomic Medicines in Human Health and Well-Being”

Muhammad Sasmito Djati

Brawijaya University Malang, Indonesia
“Herbal Medicine a Holistic Approach: in case of food supplement formulation of Sauropusandrogynus and Elephantopuscaberto modulate immune and hormonal system in pregnant Salmonella typhi infected mice”

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REVIEWER

1. Dr. Zahid Iqbal, Ph.D (Isra University, Islamabad, Pakistan)
2. Prof. Dr. Abdul Khaliq (University of Agriculture, Faisalabad)
3. Dr. Mohammad Khalid Ashfaq, DVM, DTVM, MS, Ph.D (University of Mississippi, USA)
4. Dr. Muhammad Mukhtar, Ph.D (American University of Ras Al Khaimah, United Arab Emirates)
5. Dr. Ir. Muhammad Sasmito Djati, MS. (Brawijaya University Malang, Indonesia)
6. Fitri Arofiati, S.Kep., Ns., MAN., Ph.D (Universitas Muhammadiyah Yogyakarta, Indonesia)
7. Dr. SN Nurul Makiyah, S.Si., M.Kes (Universitas Muhammadiyah Yogyakarta, Indonesia)
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14. Dr. dr. Tri Wahyuliati, Sp.S, M.Kes (Universitas Muhammadiyah Yogyakarta, Indonesia)
15. Dr. Elsy Maria Rosa, M.Kep (Universitas Muhammadiyah Yogyakarta, Indonesia)
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19. Dra. Lilis Suryani, M.Kes (Universitas Muhammadiyah Yogyakarta, Indonesia)
20. Drh. Tri Wulandari K, M.Kes (Universitas Muhammadiyah Yogyakarta, Indonesia)
21. Dr. dr. Wiwik Kusumawati, M.Kes (Universitas Muhammadiyah Yogyakarta, Indonesia)
22. Sabtanti Harimurti, S.Si., M.Sc., Ph.D., Apt. (Universitas Muhammadiyah Yogyakarta, Indonesia)

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**SPEAKER OF
INTERNATIONAL CONFERENCE**

ICMHS-P-1-20

**Relationship Thyroid Status to the Physical Growth and
Psychomotor Development on Children Under 2 Years in Endemic
Areas of Iodine Deficiency Disorders in District Samigaluh of
Kulonprogo Regency**

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Mardylla Nur Fitriany³**

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Abstract

Children in endemic areas of Iodine deficiency disorders (IDD) are at risk for hypothyroidism that make disruption of growth and development. Children under 2 years olds is a critical age when there is a rapid growth in both physical and social development, mental, emotional, and intelligence that will greatly affect the growth of subsequent developments. The aim to determine the profile of thyroid status and its relationship to growth and psychomotor development of children under the age of 2 years in an endemic area IDD. This research used analytic observational with cross sectional design. The subjects were 50 children under the age of 2 years in the village Ngargosari, Samigaluh, Kulonprogo. Measurement of levels of thyroid status (TSH and FT4) using ELISA method in the Laboratory of Research and Development of Iodine Deficiency Disorders Borobudur Magelang. Physical growth indicators were measured include body weight, body length, body mass index (BMI) using indicators Z-score. Anthropometric measurements using a standardized measuring tool. Measurement of psychomotor development is done by using the Denver II test. Data were analyzed by Spearman correlation test. Retrieved median TSH level was 1,715 ng / dL (1.4 to 2.1 ng / dL) and the median levels of FT4 was 1,620 ng / dL (0.08 to 17.4 ng / dL). Thyroid status consist euthyroid 82%, subclinical hypothyroidism 14%, and subclinical hyperthyroidism 4%. Anthropometric results are generally within the normal range. But there are still 4% malnutrition, 6% thin, 2% very thin, and 4% fat. Four percent have short stature and

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2% very short. Thyroid status with euthyroid distribution, Subclinical Hypothyroidism and Hyperthyroidism Subclinical, correlated with Weight to age (W/A) ($p = 0.027$; $r = -0.313$). No significant correlation was found between thyroid status with Body Length / Age, Body Mass Index/Age, Body Weight / Body Length. Psychomotor development of children consist advance 8% and normal 66%, but still found the subjects with suspected delays about 26%. Thyroid status is correlated to the development of fine motor skills of children under two years of age ($p = 0.027$ and $r = -0.320$). Thyroid status did not correlate with the other three aspects, namely the development of gross motor, social and personal language. Thyroid status of children under 2 years olds consist euthyroid 82%, subclinical hypothyroidism 14% and subclinical hyperthyroidism 4%. Thyroid status correlates to Weight/Age and fine motor development.

Keywords: Thyroid Status, Physical Growth, Psychomotor Development.

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INTRODUCTION

Soil iodine deficiency and Goitrogen have caused many Indonesian regions to become endemic goiter areas. Research into the adequacy rates of T₄ and its effect on children in endemic areas is very important in order to determine the Quality of Life and human resource capacity in endemic areas.¹ Various factors cause decreased sensitivity to thyroid hormones, among which are defects causing thyroid hormones to penetrate the cell, altered metabolism and intracellular distribution, the effects of the cytosol/non-genomic causes, altered binding to receptors and translation in the nucleus or advanced co-regulator abnormalities after receptor binding.²

Children born to women with hypothyroidism will have congenital hypothyroidism (HK), which is believed to be the cause of preventable intellectual disability.³ The neonatal TSH rate has shown a close relation to children's neurocognitive development.⁴ Children and subclinical hypothyroidism adolescents have decreased meaningful attention.⁵

In endemic goiter areas, there is concern about children being born in lower or abnormal conditions. Congenital hypothyroidism is a childhood disease from birth which, if poorly diagnosed and handled, causes thyroid hormone deficiency in childhood, which can lead to mental retardation as well as cretinism.⁶

Growth and development increase rapidly at early ages, from 0-5 years, which is known as the golden period. This period of growth and development is very important in the human brain and attention should be paid to children's growth and development carefully to detect abnormalities as early as possible.⁷ Brain cell development occurs rapidly in fetuses and children up to two years of age; therefore, pregnant women with a minor rate of IDD can be adversely affected by the fetus' motor and cognitive development, which relates to the development of the child's intelligence. Research by Noor et al. (2009),⁸ found that 40% of adolescents had hypothyroidism in endemic goiter areas, with a low average of IQ score.

The aim of this study was to identify and investigate the relationship between TSH and FT4 on the growth and development of children under 2 years of age in areas endemic for IDD, in Temon Subdistrict, Kulon Progo, Yogyakarta.

MATERIALS AND METHODS

This research used the observational analytic method to determine thyroid status. Furthermore, the data used were cross-sectional, to identify a relationship between thyroid status, physical growth and psychometric development in children under 2 years of age in Ngargosari village, Samigaluh Subdistrict, Kulon Progo Regency, Yogyakarta Province.

The research was conducted from May to August 2015, in Ngargosari village, Samigaluh Subdistrict, Kulon Progo, and included 50 children under 2 years of age who

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live in Camden village, Ngalian, Petet, Pucung, Tegal Sari, Trayu, Tritis, and Tulangan. Subject inclusion criteria were an age of 3 to 24 months, living in the area endemic for IDD and approval of the parents. Subjects were excluded in the presence of infection or trauma that may disrupt the growth of psychometric process.

Research variables and test methods. The thyroid status was defined by analyzing TSH and FT4 in the blood serum using the ELISA technique. The tests were conducted in the Laboratory for Research and Development of Iodine deficiency (IDD) Borobudur, Magelang. Furthermore, patients were categorized into hypothyroid, euthyroid, and hyperthyroid groups.

Physical growth is an assessment of children's physical growth condition. The investigations divided into: a. Weight, Body weight was measured by a weight scale to gain a result kilograms (kg). The results were then converted into standard deviation (SD) with a Z-Score growth curve, i.e. body weight curve divided by tb^2 to age, which differentiated between men and women. After being converted, this was translated into the ordinal scales: very thin ($<-3SD$), thin ($-3SD$ s/d $<-2SD$), normal ($-2SD$ s/d $<2SD$), fat ($> 2SD$ s/d $3SD$), and obese ($> 3SD$), b. Height/length of the body. Body height is the long axis of the body measured from the leg to the vertex. Height/length of the body was measured by infantometer to obtain results in centimeters (cm), which were then converted to the standard deviation of the Z-Score growth curve, by comparing body weight curve to body height for age; this differs between males and females. After conversion, this was translated into the ordinal scales: very short ($<-3SD$), short ($-3SD$ s/d $<-2SD$), normal ($-2SD$ s/d $<2SD$), tall ($> 2SD$ s/d $3SD$), and very tall ($> 3SD$).

Psychometric Development Investigation. The children's psychometric development was measured by using DDST-II (Denver Development Screening Test II). This consists of fine motor, gross motor, language, and social personality factors. Afterwards, each was categorized into delayed if the score was 2 to 4, normal if the score was 5 and advanced if the score was 6 to 8.

Subject Characteristic of Children under 2 years is the characteristic table of children under 2 years, with 7 criteria: age, birth weight, sex, gestational age, exclusive breastfeeding, additional supply of exclusive breastfeeding and hypothyroid index assessment. Anthropometric data retrieval was also conducted, along with psychometric development assessment and taking up to 3 ccs of blood for laboratory examination.

In total, there were 50 subjects with data for the anthropometric tests and thyroid hormone rates were tested using an ELISA; the results were presented in tabular form. Data were analyzed using the appropriate correlation test in the SPSS 15.0 Program.

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RESULTS AND DISCUSSION

Table 1. Subject Characteristic of Children Under 2 Years

No	Criteria	Total		
		N	%	∑n
1	Age			
	0-12 months	29	58%	50
	13-24 months	21	42%	
2	Birth Weight (kg)			
	< 2,5	1	2%	50
	2,5 – 4	49	98%	
	> 4	0	0	
3	Sex			
	Male	23	46%	50
	Female	27	54%	
4	Gestational Age			
	Preterm	1	2%	50
	Aterm	48	96%	
	Postterm	1	2%	
5	Exclusive Breastfeeding			
	Yes	46	92%	50
	No	4	8%	
6	Additional Supply of Exclusive Breastfeeding			
	Yes	43	86%	50
	No	7	14%	

Subject Characteristics. The age of children included in the research was 3-24 months. By using an early age, coverage was expected to detect neonatal hypothyroidism earlier, especially if factors related to psychometric development could be detected quickly. This is because that age is also the period of rapid growth and development in the human brain, with brain development slowly growing on its own until the end of the second year. This is due to declining nutritional needs and appetite as well as the first occurrence of selecting food naturally.⁹ Childbirth weight needs to be determined to assess the child's development in the mother's womb as this is closely

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related to children's growth and development in the future, especially if nutritional intake after birth is poor.⁹

Gender did not cause any misperceptions in the research analysis because there was no standard thyroid status test based on this; however, information on gender needs to be known to complete accurate datasets.

Gestational age needs to be determined to assess the child's development in the womb. Too long a gestational period (*post-term*) results in large children, which can cause oligohydramnios. As a result, the fetal fluid mixes with meconium, and swallowing meconium can affect the child's development in the future. On the other hand, premature gestation (*preterm*) can lead to memory constraints, less visual identification, less attention to softness and an avoidance of eye contact. However, the current advancements in treatment technology mean that this effect does not always occur because premature babies are often able to catch up.¹⁰ Assessment of nutrient intake can be performed by analyzing the food consumed by the baby. Nutrient intake is closely related to brain development, especially before the age of 2 years.⁹

Thyroid Status. The median values for thyroxine (FT4) and TSH levels in Ngargosari village were within normal ranges: 0.8 to 1.8 ng/dL and 0.4 to 5.0 ng/dL, respectively. Most of the children under 2 years of age in Ngargosari village had normal thyroxine and TSH levels in their body.

Table 2. Distribution Table of Thyroid Status in Ngargosari Village

Criteria	N	FT4 Value	TSH Value
		(ng/dL)	(ng/dL)
Lowest Level	-	1,40	0,08
Highest Level	-	2,10	17,24
Median Level	-	1,620	1,715
Average on Subclinical Hypotiroidism Group	7	1,63	7,77
Average on Euthyroid Group	41	1,614	1,880
Average on Subclinical hyperthyroidism Hipertiroid Group	2	1,935	0,095

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Table 3. Thyroid Status in Ngargosari Village

TSH Status	N	FT4 Status			
		Low (< 0,8 ng/dL)		Normal (0,8-2,0 ng/dL)	
		N	Note	N	Note
Low (< 0,3 mIU/L)	2 (4%)	0	-	2	Subclinical Hyperthyroidism
Normal (0,3 - 4,0 mIU/L)	41 (82%)	0	-	41	Normal
Increase (> 4,0 mIU/L)	7 (14%)	0	-	7	Subclinical Hypothyroidism

Normal thyroid status was seen in more subjects than subclinical hypothyroidism and subclinical hyperthyroidism; namely, 41 children (82%) compared to 7 babies (14%) and 2 babies (4%), respectively. This meant that the average thyroid status of children under 2 years of age in Ngargosari village was normal. Subclinical hypothyroidism is defined as a slight increase in TSH rates and normal rates of FT4, and is accompanied by few/no clinical symptoms. Its prevalence increases with age in both men and women. There were many variations, but most patients with positive TPO antibodies develop clinical hypothyroidism. The main cause of subclinical hypothyroidism is iodine deficiency rate or low iodine intake. In areas of sufficient iodine intake, the main cause is Hashimoto's thyroiditis, which is an autoimmune disease caused by autoantibodies to TPO. Other causes are autoimmune diseases and radiation.¹¹

Subclinical Hyperthyroidism could be available at a low rate of TSH with normal FT4 (it is usually in high normal, closer to the upper range of the reference range) meanwhile, there had no clinical symptoms or less. This situation reflected that there was the reduction in the production and secretion of TSH, as responded to soft increased thyroid hormone within the range of reference before the real clinical.

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Table 4. Children Anthropometric Characteristics Based on Z-Score

No	Criteria	Total		
		N	%	Σn
1 Body Length Based on Age				
	Very Short (< -3SD)	1	2%	
	Short (-3SD s/d < -2 SD)	2	4%	
	Normal (-2 SD s/d 2 SD)	45	90%	50
	Tall (> 2 SD)	2	4%	
2 Body Weight Based on Age				
	Malnutrition (-3 SD s/d < -2 SD)	2	4%	
	Good Nutrition (-2 SD s/d 2 SD)	48	96%	50
	Better Nutrition (> 2 SD)	-	-	
3 Body Weight Based on Body Length				
	Very Thin (< -3 SD)	1	2%	
	Thin (-3 SD s/d < -2 SD)	3	6%	50
	Normal (-2 SD s/d 2 SD)	44	88%	
	Fat (> 2 SD)	2	4%	
4 Body Mass Index Based on Age				
	Very Thin (< -3 SD)	1	2%	
	Thin (-3 SD s/d < -2 SD)	3	6%	50
	Normal (-2 SD s/d 2 SD)	44	90%	
	Fat (> 2 SD)	2	4%	

Anthropometric Characteristics. Generally, the nutritional needs of children under 2 years of age in Ngargosari village, Samigaluh Subdistrict, Kulon Progo, is normal. The distribution of nutritional status in children under 2 years of age in Ngargosari village was based on body length to age; in the 50 subjects assessed, there were 47 normal children (94%) and only 3 children (6%) who were short or very short. Based on body weight to age, there were 48 children (96%) who were well-nourished and only 2 children (4%) with a lower nutritional status. Based on body weight to body length, it was found that 44 children (88%) had normal nutrient status, 2 children (4%) were thin, 2 children (4%) were very thin and 2 children (4%) were fat, which was also shown by Body Mass Index (BMI) assessment.

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Table 5. Frequency Distribution of Body Length Based on Thyroid Status

No	Thyroid Status	Children Body Length to Age								Correlation Test Spearman
		Tall (> 2 SD)		Normal (-2 SD s/d 2 SD)		Short (-3 SD s/d < -2 SD)		Very Short (< -3 SD)		
		N	%	N	%	N	%	N	%	
1	Hypothyroid Subclinical	0		7	14%	0		0		r = - 0,145 p = 0,316
2	Euthyroid	2	4%	36	72%	2	4%	1	2%	
3	Hyperthyroid Subclinical	0		2	4%	0		0		
	Total	2	4%	45	90%	2	4%	1	2%	

Relationship between Thyroid Status and Anthropometric Variables. Table 5. shows the distribution of body length for children under 2 years of age in Ngargosari village. This generally shows that 3 out of 50 children had very short posture child (6%) and 2 had short posture (4%), all of which belonged to the euthyroid group; there were no cases in the subclinical hypothyroidism or subclinical hyperthyroidism groups. The resulting analysis showed that $p=0.316$, indicating that there is no significant correlation between the two variables.

Table 6. Frequency Distribution of Body Weight Based on Thyroid Status

No	Thyroid Status	Children Body Weight to Age						Correlation Test Spearman
		Good Nutrition (- 2 SD s/d 2 SD)		Malnutrition (- 3 SD s/d < -2 SD)		Bad Nutrition (< -3 SD)		
		n	%	N	%	N	%	
1	Hypothyroid Subclinical	7	14%	0		0		r = - 0,313 p = 0,027
2	Euthyroid	39	56%	2	4%	0		
3	Hyperthyroid Subclinical	2	4%	0		0		
	Total	48	96%	2	4%			

Table 6. shows that 2 malnourished children (4%) had normal thyroid status (euthyroid). The results of data analysis were $p=0.027$, which showed that there was a significant correlation between the two variables; the strength of the correlation was tested, $r=-0.313$ (0.20 to 0.399), showing a weak and negative correlation. The greater the negative correlation of one variable, the smaller the value would be for the other variables.

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Table 7. Frequency Distribution of Body Weight- Body Length Based on Thyroid Status

No	Thyroid Status	Body Weight to Children Body Length								Correlation Test Spearman
		Fat		Normal		Thin		Very Thin		
		(> 2 SD)	(-2 SD s/d 2SD)	(- 3 SD s/d < -2SD)	(< -3SD)	N	%	N	%	
1	Hypothyroid Subclinical	1	2%	6	12%	0		0		r = - 0,186 p = 0,195
2	Euthyroid	1	2%	36	72%	3	6%	1	2%	
3	Hyperthyroid Subclinical	0	0%	2	4%	0	0%	0	0%	
	Total	2	4%	44	88%	3	6%	1	2%	

Table 7. shows that there were 6 out of 50 children (12%) experiencing body weight-body length disorders, with 1 very thin child (<-3SD), 3 thin children (-3 SD to <-2 SD) and 2 fat children (>-2SD) within the euthyroid group; there was 1 child in the subclinical hypothyroidism group (2%). The results of the data analysis show $p=0.195$, indicating that there is no significant correlation between the two tested variables.

Table 8. Frequency Distribution of Body Mass Index (BMI) Based on Thyroid Status

No	Thyroid Status	BMI to Children age								Correlation Test Spearman
		Fat		Normal		Thin		Very Thin		
		(> 2 SD)	(-2 SD s/d 2 SD)	(-3 SD s/d < -2 SD)	(< -3 SD)	N	%	N	%	
1	Hypothyroid Subclinical	1	2%	6	12%	0		0		r = -0,149 p = 0,303
2	Euthyroid	1	2%	36	72%	3	6%	1	2%	
3	Hyperthyroid Subklinik	0		2	4%	0		0		
	Total	2	4%	44	90%	3	6%	1	2%	

Table 8. showed that 6 out of 50 children experienced a Body Mass Index (BMI) disorder with 5 children (10%) from the Euthyroid group and 1 child from the subclinical hypothyroidism group. The results of the data analysis show $p=0.303$, indicating that there is no significant correlation between the two variables.

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Meanwhile, there was no correlation between the variables of thyroid rate and body mass index to age. This proves that one of the hormonal changes in obesity involves the thyroid hormone. It has been suggested that the axis of the hypothalamus-pituitary-adrenal works hyperactively in obesity.¹² In contrast, changing thyroid hormones, especially the increasing TSH and decreasing T3 and T4 levels, would give the effect of energy expenditure, which can eventually cause obesity. A study in 2007 in Semarang showed a correlation between thyroid level with BMI and body fat percentage. TSH was shown to have a significant correlation to BMI and body fat percentage, while FT3 had a negative correlation to body fat percentage. The research used a cross-section research design and included 74 adolescents, aged 10-14 years, from both obese and normal nutrition groups. Obesity was determined based on the Body Mass Index chart CDC 2000.¹³ Most of the research on obesity with subclinical hypothyroidism reported low rates of TSH, with FT3 being low or normal, and FT4 remaining normal.¹⁴

Based on the results of statistical analysis of body weight and body length to thyroid status, it has been shown that there is no significant correlation between the two variables. However, there was one child (2%) in the subclinical hypothyroidism group who was fatter, showing that thyroid hormone affects the metabolic system due to a decreased metabolic rate, and eventually causes a decreased BMR (basal metabolic rate) and oxygen consumption. The decreased thermogenic capacity would cause cold intolerance, with food intake and appetite decreasing but body weight increasing, caused by fluid retention, and salt and fat accumulation. There was decreased protein synthesis, fatty acids generation, and lipolysis. The total amount of cholesterol and LDL cholesterol increased due to the decreased clearance of HDL cholesterol. Triglyceride rates might be normal or increased. Homocysteine rates would also be increased.^{15, 16}

Table 9. Frequency Distribution of Psychometric Development in Ngargosari Village

No	Aspect	Interpretation					
		Delayed for Aspect		Normal		Advance	
		N	%	N	%	N	%
1	Fine Motor	12	25	31	64,6	5	10,4
2	Gross Motor	13	26	34	68	3	6
3	Social personality	5	10	37	74	8	16
4	Language	13	26	33	66	4	8

The above discussion shows that 1 out of 4 indicators of physical growth in children had a significant correlation with thyroid status. This proves that thyroid hormones could at least in part affect growth.

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Table 10. Frequency Distribution of Fine Motoric development Based on Thyroid Status

No	Thyroid Status	Fine Motoric development						N
		Delayed for Suspect		Normal		Advance		
		N	%	N	%	N	%	
1	Subclinical Hypothyroid	0	0	5	10,4	2	4,2	p = 0,027 r = -0,320
2	Euthyroid	11	22,9	25	52,1	3	6,3	
3	Subclinical Hyperthyroid	1	2,1	1	2,1	0	0	
	Total	12	25	31	64,6	5	10,4	

Psychometric Development Characteristics. Table 10. shows that the fine motoric development of children with subclinical hypothyroidism ranged from normal to advanced, while children with euthyroidism had data ranging from delayed, through normal to advanced.

Meanwhile, the distribution of subclinical hyperthyroidism data only ranged from delayed to normal. The results of data analysis using correlation tests between thyroid status and fine motoric development in children under two years of age had a value of $p=0.027$, which shows that there is a significant correlation between thyroid status and fine motoric development; also, $r=-0.320$, indicating that the higher the thyroid status, the greater the influence on fine motoric development.

Table 11. Frequency Distribution of Gross Motoric development Based on Thyroid Status

No	Thyroid Status	Gross Motoric development						Correlation Spearman
		Delayed for Suspect		Normal		Advance Test		
		N	%	N	%	N	%	
1	Subclinical Hypothyroid	2	4	5	10	0	0	p = 0,272
2	Euthyroid	11	22	28	56	2	4	
3	Subclinical Hyperthyroid	0	0	1	2	1	2	
	Total	13	26	34	68	3	6	

Table 11. shows that gross motoric development in children with subclinical hypothyroidism ranged from delayed to normal, the data for children with euthyroid status was complete, namely delayed, normal and advanced, while children with the status of subclinical hyperthyroidism had data ranging from normal to advanced.

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The data analysis was performed using the Spearman correlation, which showed an association between thyroid status and gross motoric development in children under two years of age ($p=0.870$), confirming that there is no significant effect of thyroid status.

Table 12. Distribution Frequency of Social-Personality Development Based on Thyroid Status

No	Thyroid Status	Social Personality Development						Correlation Spearman
		Delayed for Suspect		Normal		Advance Test		
		N	%	N	%	N	%	
1	Subclinical Hypothyroid	0	0	4	8	3	6	$p = 0,548$
2	Euthyroid	5	10	33	66	3	2	
3	Subclinical Hyperthyroid	0	0	0	0	2	4	
	Total	5	10	37	74	8	16	

Table 12. shows that social development in children with subclinical hypothyroidism ranged from normal to advanced, children with euthyroid status had comprehensive data distribution, ranging from delayed to advanced, while children with subclinical hyperthyroidism had only advanced data. The results of data analysis using the correlation between thyroid status and social personality development in children under two years of age was $p=0.548$, which showed there is no significant correlation between thyroid status and social personality development in children under two years of age.

Table 13. Distribution Frequency of Language Development Based on Thyroid Status

No	Thyroid Status	Language Development						Correlation Test Spearman
		Delayed for Suspect		Normal		Advance		
		N	%	N	%	N	%	
1	Subclinical Hypothyroid	3	6	4	8	0	0	$p = 0,475$
2	Euthyroid	9	18	28	56	4	8	
3	Subclinical Hyperthyroid	1	2	1	2	0	0	
	Total	13	26	33	66	4	8	

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Table 13. shows that the language development in children with subclinical hypothyroidism ranged from delayed to normal, children with euthyroid status had comprehensive data distribution from delayed to advanced, while the distribution for subclinical hyperthyroidism was only from delayed to normal. The results of the data analysis using Spearman correlation test to investigate an association between thyroid status and language development in children under two years of age had a value of $p=0.475$, which showed that there was no significant correlation between thyroid status and language development in children under two years of age.

Thyroid status was assessed simultaneously using TSH and FT4, to determine those patients with subclinical hypothyroidism, euthyroid status and subclinical hyperthyroidism. It was very influential on growth and development, because it is involved in the metabolism of proteins, carbohydrates, and fats.¹⁷ Thyroid status was combined of two parameters. The first parameter is TSH, the most important early effect is the start of thyroglobulin proteolysis within 30 minutes, causing the release of thyroxine and triiodothyronine into the blood and giving a high or low value depending on FT4 levels in the blood. The second is FT4, which indicates the hormone thyroxine levels based on tissues as well as an increased rate of chemical reactions in most cells, showing an increase in the body's metabolic rate.¹⁸ A lower increase in thyroid hormone causes muscles to react strongly, but if there are excessive amounts of these hormones, the muscles will become weakened due to excessive protein catabolism. In contrast, thyroid hormone deficiency causes the muscles to slow, with muscles relaxing slowly after contraction.¹⁸

The results of the Spearman test on gross motoric development, social personality, and language show that these four development indicators were not significantly correlated with thyroid status. However, the results of the Spearman test on fine motoric development showed that there was a significant correlation between thyroid status and fine motoric development in children under two years of age with a negative correlation, namely the higher the thyroid status, the greater the influence on fine motoric development. Therefore, the hypothesis of the existence of a correlation between thyroid status in gross motoric development, social and personal language was not proven, but a correlation between thyroid status and fine motoric development was confirmed.

Pregnant women with subclinical hypothyroidism and Euthyroid had not significant impact to their children developmental.¹⁹ The development scores on each of hypothyroid and of Euthyroid child remained on normal and rapid. Moreover, psychometric development on children of age 0 to 2 years was affected by other factors such as maternal nutrition during pregnancy, child nutritional status, stimulation which being given to children directly and regularly as well as mothers' understanding had very

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important role to the child.¹⁷

The caused of psychometric development delays, among others were genetic or chromosomal disorders such as Down syndrome, or infection of the nervous system such as cerebral palsy, spina bifida, rubella syndrome, history of higher risk of children such as premature or too early born, low-birth weight child, early gained weight child which required intensive care as well as the difficult birth, especially if there was broken brain, it would be inhibited the psychometric growth.²⁰

Although the result of cross-sectional research showed that there was no significant correlation between thyroid status with psychomotoric development on aspects of gross motor, Social personality, and language of children under 2 years of age and was only significant in the aspect of fine motor skill, but it must be recalled that thyroid hormones is a hormone that works and influential in the long-term, as well as affected in the body's metabolism.¹⁸ Therefore, the early detected of thyroid status, if applicable, should be conducted to children, especially to the age of golden period. If there is detected abnormality, it can immediately be given the management to prevent further impacts in the future.

CONCLUSION

The research results in Ngargosari village, Samigaluh Subdistrict, Kulon Progo Regency showed that children under 2 years of age with the Euthyroid, Subclinical Hypothyroidism and Subclinical Hyperthyroidism statuses were 82%, 14%, and 4%. Anthropometric results were generally within the normal range. But there were 4% of short body stature, 4% of malnutrition, 6% of thin, 4% of fat. It was found that body stature (BS) data, namely short and very short, 2% and 2%.

Thyroid status with distribution of Euthyroid, Subclinical Hypothyroidism and Hyperthyroidism Subclinical statuses, correlated with body weight to age (W/A) ($p = 0.027$; $r = - 0.313$). There was no significant correlation between thyroid status with BS/A, BMI/A, BW/BS on children under 2 years of age.

The motoric development of children under 2 years with advance and normal rates were 8% and 66%, but it still found the subject with delayed for suspects by 26%. Thyroid status correlated to fine motoric development of children under two years of age but it did not correlated with the other three aspects, namely the gross motoric development, social personality, and linguistic capability.

It is necessary to conduct further research on various factors that affects to physical growth and psychometric development of children in endemic area of IDD.

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