

# Urinary Iodine Excretion (UIE) of Elementary School Children in Coastal Areas of Gisik Cemandi Village, Sidoarjo District and Kedung Cowek Village, Surabaya City, East Java Province, Indonesia

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Peppy Nawangsasi

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# PROCEEDING

## Urinary Iodine Excretion (UIE) of Elementary School Children in Coastal Areas of Gisik Cemandi Village, Sidoarjo District and Kedung Cowek Village, Surabaya City, East Java Province, Indonesia

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### Abstract

Iodine deficiency disorders (IDD) caused a negative impact by inhibiting the physical growth and brain development of fetuses, infants, toddlers and children; and in the long term it will affect the quality of human resources. Based on the medical examination of elementary school childrens in the coastal area by medical student of Hang Tuah University in 2016, there were children with stunting and having enlargement of thyroid gland. Urinary Iodine Excretion (UIE) is one of the indicator of body's iodine adequacy. This study aimed to determine the prevalence of iodine deficiency by UIE in the 4<sup>th</sup> – 6<sup>th</sup> year-students at elementary schools in Gisik Cemandi Village, Sidoarjo Regency and Kedung Cowek Village, Surabaya City. This study used quantitative methods by measuring UIE, height, weight and palpation of the thyroid gland. UIE measurement was conducted at Balai Besar Laboratorium Kesehatan Surabaya. Of the total 191 elementary school childrens, 61 children gave their urine samples. Girls had a lower median UIE (71.40  $\mu\text{g/L}$ ) than boys (72.35  $\mu\text{g/L}$ ). The prevalence of mild iodine deficiency in children with short height per age category was 24.5%, while normal height per age was 75.5%. A mild iodine deficiency prevalence in Gisik Cemandi Village was higher (94.7%) than in Kedung Cowek Village (83.4%). Majority of elementary school childrens in Gisik Cemandi Village, Sidoarjo Regency and Kedung Cowek Village, Surabaya City had a mild iodine deficiency with median UIE of 71.40  $\mu\text{g/L}$  below the normal value of UIE for elementary school childrens based on WHO criteria (100- 199  $\mu\text{g/L}$ ). Accordingly, the related parties should give education and nutrition interventions to combat the iodine deficiency..

*Keywords: Iodine Deficiency, Ekskresi Urine Iodine, Elementary School Children*

### Background

Iodine deficiency may be caused by inadequacy of iodine intake or disruption in iodine absorption. Iodine deficiency brings negative effects on the growth and development of babies and children. In the long term, iodine deficiency may decrease the quality of human resources (Zimmermann & Boelaert 2015; Zimmermann 2009).

Indonesia was in the fifth rank in the prevalence of stunted children, after India, Nigeria, Pakistan and China (de Onis et al. 2012). The Indonesian basic health research conducted in 2013 reported 37.2% children under five years old were stunted (Kementerian Kesehatan RI 2013).

The decrease in the short term memory is often ignored by the society and considered normal in the iodine deficiency endemic areas, even though the deficiency may lead to the decrease of IQ and mental retardation (Piccone 2011).

Iodine deficiency is an indicator of adequate levels of iodine in the body. Elementary school children are susceptible to iodine deficiency due to their high metabolism related to their growth and development (Li and Eastman 2012).

This study was conducted to determine the prevalence of iodine deficiency in elementary school students in Gisik Cemandi Village, Sidoarjo District and Kedung Cowek Village, Surabaya City, East Java Province, Indonesia.

## Methods

This study used quantitative methods by measuring sex, age, body weight, body height for age, body mass index (BMI) and urinary iodine excretion (UIE). The urine samples were sent to the health laboratory in Surabaya and analyzed using Amonium Persulfat method. The research was approved by the human research ethics committee of the Faculty of Medicine, Universitas Hang Tuah.

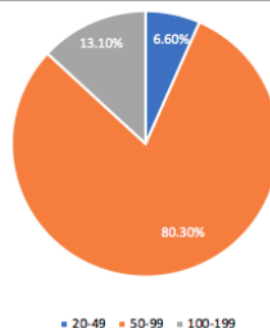
## Results and Discussion

Of the total 191 elementary school students, their mean age was 11 years old, their mean weight was 31.8 kg, their mean height was 136.9 cm and their mean BMI was 16.7 kg/m<sup>2</sup>.

Table 1. Characteristics of study subjects

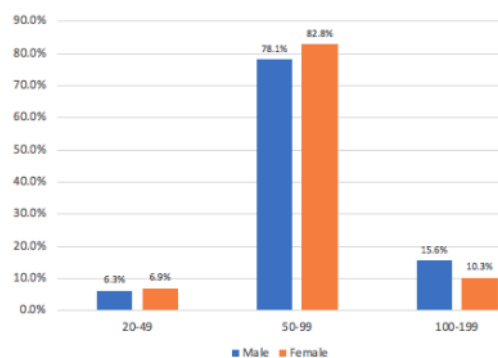
Characteristics	Mean	SD
Age	11.01	1.095
Weight	31.8272	9.04719
Height	136.9644	8.24615
BMI	16.7380	3.48089

There were 61 students who gave their urine samples, and their UIE results showed majority of study subjects (80.3%) had mild iodine deficiency with UIE between 50-99  $\mu\text{g/L}$ , 13.1% had adequate iodine nutrition with UIE between 100-199  $\mu\text{g/L}$ , and 6.6% had moderate iodine deficiency with UIE between 20-49  $\mu\text{g/L}$ .



Graph 1. Distribution of UIE categories

The finding indicated that iodine nutrition in the two coastal villages were inadequate. This fact was affected by several factors, including goitrogenic substances (Wahyu et al 2014), lack of parental knowledge in the importance of iodine (Gatie 2006), the increase of the need and usage of thyroid hormone in children who were in the growth and developmental stage, low iodine content in the soil (Saidin 2009), deficiency of other nutrients such as calory, protein, vitamin A and selenium (Rintato 2003).



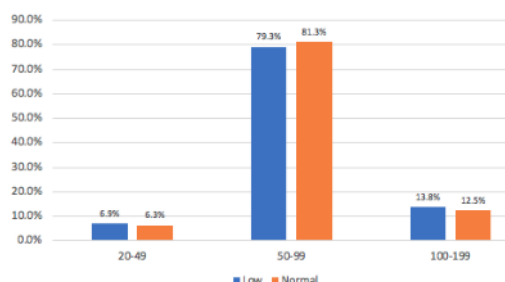
Graph 2. UIE distribution by sex

The median UIE in female students was 71.4  $\mu\text{g/L}$ , and majority (82.8%) of female students had mild iodine deficiency with UIE between 50-99  $\mu\text{g/L}$ . The median UIE in male students was 72.35  $\mu\text{g/L}$ , and majority (78.1%) of male students had mild iodine deficiency with UIE between 50-99  $\mu\text{g/L}$ . Thus, the prevalence of mild iodine deficiency was higher in female than in male students.

Several studies reported that females were at higher risk of getting thyroid disorder, due to estrogen role in increasing thyroid receptor in hypophyse that lead to increasing the need of iodine (Oribio et al. 2007). In addition, female students experienced growth spur earlier than male students (Mabruroh et al. 2011) that increase metabolism and the need of thyroid hormone (Johner et al. 2011). Therefore, UIE in females were lower than that in males.

In my study, students with BMI/age in the low category had median UIE of 64.4  $\mu\text{g/L}$ . Those with BMI/age in the normal category had median UIE 75.55  $\mu\text{g/L}$ . Students in both categories were having mild iodine deficiency (UIE between 50-99  $\mu\text{g/L}$ ).

UIE shows current iodine status, but anthropometry is affected by multifactors, including prenatal, postnatal, child, and pubertal nutritional and environmental conditions (Noor et al. 2012). Iodine deficiency may disrupt thyroid function. Thyroid hormone may affect growth hormone that converse thyroxine (T4) to T3 (Soetjiningsih 2004).



Graph 4. UIE distribution by BMI/Age

## Conclusion

The present study found that majority of students in both coastal villages had mild iodine deficiency. Therefore, the primary health center should take immediate action to overcome the finding.

## Acknowledgement

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