



Universitas Jenderal Soedirman  
Purwokerto



4th DIES NATALIS  
FACULTY OF MEDICINE AND HEALTH SCIENCES  
JENDERAL SOEDIRMAN UNIVERSITY

## BOOK OF ABSTRACTS AND CONFERENCE PROGRAM

The First International Conference In Medicine And Health Sciences  
(ICMHS) 2011

*“Interprofessional Education: Walking Through  
Collaborative Learning To Collaborative Practice”*

HORISON HOTEL, PURWOKERTO, 29 November – 1 December 2011

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## OPENING REMARK

Assalamu'alaikum wr. wb.

Distinguished guest, keynote speaker, participant, colleague and student. *Alhamdulillah robbil'amin*, thank to God Almighty for bestowing us opportunity and healthiness so that we are able to attend "The First International Conference on Medecine and Health Science" organised by Faculty of Medicine and Health Science, Jenderal Soedirman University.

First and foremost, on behalf of Jenderal Soedirman University I would like to welcome all of you to Purwokerto, a town lays on the slope of mount Slamet – the highest mount in Java, but, especially I would like to extend a warm welcome "*SELAMAT DATANG*" to keynote speakers from abroad who have traveled far from Australia, Hongkong and Thailand to come here to deliver their speeches in the conference focusing on interprofessional education: walking through collaborative learning to collaborative practices.

Let me begin by thanking the keynote speakers for their effort to make long journey to Purwokerto to join this forum. I wish you enjoy your stay in Purwokerto.

Distinguished guests and participants, Hugh Barr from UK Center for the Advancement of Interpersonal Education defines Inter-Professional Education (IPE) as "the application of principles of adult learning to interactive, group based learning, which relates collaborative learning to collaborative practice within a coherent rationale which is informed by understanding of interpersonal relation and processes of professionalisation". IPE focuses on learning from and about each other to improve collaboration. It focuses on interprofessional education where the ultimate intention is to improve collaborative practice. Therefore, the application of IPE as suggested by the conclusion of the discussion commenced in a seminar organised by student of Faculty of Medicine and Health Science, Jenderal Soedirman University on Wednesday, May 25<sup>th</sup>, 2011 is essential for developing capacity of collaboration and communication of the health science students. These capacities are necessarily be incorporated in curricula and internalized through education in such a way that qualify students to work effectively in interprofessional team. It was also implied that collaboration might be established if there were equivalent knowledge among health profession students. Other issues on interprofessional education shall be explored in this conference and the objectives of the conference shall be achieved.

In conclusion, I appreciate the effort of the committee to organize this conference since IPE in Indonesia has only recently been promoted, and the conference with the topic of IPE shall encourage further applicaton in health science education. I also thank to the keynote speakers for their kindness for sharing knowledge and experience in the field of their interests in this conference. My thank also goes to the participants since without their attendance this conference would have not been possible. I hope the conference could provide an inspiring forum for educator, clinician, researcher, student and policy maker to share experience and exchange ideas on IPE. I also hope the conference could produce the recommendations applicable for further development of IPE application in health science education.

I wish the conference a great success. Thank you very much for your kind attention.

Wassalamu'alaikum wr wb.

Purwokerto, November 29<sup>th</sup>, 2011

Rector,  
Prof. Edy Yuwono, Ph.D



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**RISK FACTORS OF FOOD PATTERN AND CONSUMPTION LEVEL OF IODINE  
AND THIOCYANATE ON GOITER INCIDENCE IN JEMBER**

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**ABSTRACT**

Iodine Deficiency Disorders (IDD) with manifestation of enlargement of thyroid gland still becomes a nutritional problem in Indonesia which is not yet overcome, and this begins to spread to coastal and lowland areas. The goiter incidence is not only because the body lacks iodine but also because the consumption of iodine is actually adequate, but the body experiences a deficiency or excess of a little element that disturbs thyroid hormone biosynthesis. This research was intended to determine risk factors of the consumption of iodine and thiocyanate on the incidence of goiter in Jember Regency that continually experiences an increase in prevalence rate of goiter incidence. This research applied a case-control study. Data on patterns and levels of iodine and thiocyanate consumption by food frequency and food recall were collected from samples of 60 people, divided into goiter and non-goiter which represented endemic goiter and non-endemic goiter areas. The results showed different score ( $p = 0.003$ ) of an average of consumption patterns of iodine-source food and the average score of consumption patterns of thiocyanate source food ( $p = 0.035$ ) was higher in non-endemic goiter area. Level of iodine consumption in the two areas of research was in the category of deficit, and the average consumption level of thiocyanate in the two areas was  $4.95 \mu\text{g}$  ( $< 10 \mu\text{g}$ ), but there was a tendency of high consumption in non-endemic goiter area. Urinary iodine level in both areas of research was included in the category of medium deficiency, and level of urinary thiocyanate completely showed goitrogen ( $> 0.61 \mu\text{g/dl}$ ). The result of statistical tests with multiple logistic regression showed that there was an influence of urinary thiocyanate level on the incidence of goiter ( $p=0.047$ ). It can be concluded that iodine consumption level of respondents was low, and the level of consumption of goitrogenic substances was high, which becomes the risk factors of goiter incidence. It is necessary to improve consumption pattern and level of iodine and goitrogenic substance for preventive treatments on the incidence of goiter.

**Key words:** Iodine Deficiency Disorders (IDD), risk factors, food consumption, iodine, goitrogenic substance

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**Risk Factors of Food Pattern and Consumption Level of Iodine and Thiocyanate  
on Goiter Incidence in Jember**

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**Abstract**

Iodine Deficiency Disorders (IDD) with manifestation of enlargement of thyroid gland still becomes a nutritional problem in Indonesia which is not yet overcome, and this begins to spread to coastal and lowland areas. The goiter incidence is not only because the body lacks iodine but also because the consumption of iodine is actually adequate, but the body experiences a deficiency or excess of a little element that disturbs thyroid hormone biosynthesis. This research was intended to determine risk factors of the consumption of iodine and thiocyanate on the incidence of goiter in Jember Regency that continually experiences an increase in prevalence rate of goiter incidence.

This research applied a case-control study. Data on patterns and levels of iodine and thiocyanate consumption by form food frequency and food recall were collected from samples of 60 people, divided into goiter and non-goiter which represented endemic goiter and non-endemic goiter areas.

The results showed different score ( $p = 0.003$ ) of an average of consumption patterns of iodine-source food and the average score of consumption patterns of thiocyanate source food ( $p = 0.035$ ) was higher in non-endemic goiter area. Level of iodine consumption in the two areas of research was in the category of deficit, and the average consumption level of thiocyanate in the two areas was  $4.95 \mu\text{g}$  ( $< 10 \mu\text{g}$ ), but there was a tendency of high consumption in non-endemic goiter area. Urinary iodine level in both areas of research was included in the category of medium deficiency, and level of urinary thiocyanate completely showed goitrogen ( $> 0.61 \mu\text{g/dl}$ ). The result of statistical tests with multiple logistic regression showed that there was an influence of urinary thiocyanate level on the incidence of goiter ( $p=0.047$ ). It can be concluded that



iodine consumption level of respondents was low, and the level of consumption of goitrogenic substances was high, which becomes the risk factors of goiter incidence. It is necessary to improve consumption pattern and level of iodine and goitrogenic substance for preventive treatments on the incidence of goiter.

Keywords: IDD, risk factors, food consumption, iodine, goitrogenic substance

## **INTRODUCTION**

Iodine Deficiency Disorders (IDD) still becomes a major nutritional problem in Indonesia. Jember is one of regencies in East Java that still struggle with this nutritional problem. In 2003, the results of IDD mapping showed that Jember belonged to fair endemic areas with the prevalence of 21.94% to 23.57%. From the results of previous studies, the researchers have found that problems of IDD in Jember were not caused by iodine deficiency but the consumption of goitrogenic substances characterized by urinary thiocyanate levels which were goitrogenic (Ningtyias, et al. 2007, 2008).

Thiocyanate will work as a competitor at the time of thyroid hormone biosynthesis phase 1; that is, trapping, where this process involves yodida transport from the blood into the follicle cells of the thyroid gland. The high consumption of thiocyanate causes the low amount of yodida that goes into the follicle cells of the thyroid gland, so the activation of yodida is inhibited, which makes iodine unable to bind to tyrosine. If this situation continues, MIT and DIT will not be formed, resulting in decreased T3 and T4 that stimulate an increase in TSH, which causes enlargement of thyroid gland as a form of adaptation. Complementing the research that has been conducted, the researchers were eager to know the consumption pattern and level which is a risk factor for goiter incidence.

## **METHOD**

This research was a case-control study, where the case was elementary school children who suffered from goiter in the endemic goiter area as many as 30, and the control was elementary school children who did not suffer from goiter in non-endemic goiter area as many as 30. Determination of thyroid gland enlargement was carried out by palpation method by palpator officer from Health Department of Jember Regency.



After that, urine sampling was taken to measure levels of iodine and thiocyanate as a profile of iodine intake and consumption of goitrogenic substances. Data on patterns and levels of iodine consumption and goitrogenic substance were taken using recall 2x24 hours method and food frequency measurement. Data on consumption rate of macro nutrients were also analyzed since protein and fat adequacy indirectly affected the goiter incidence.

Data were analyzed by Kolmogorov Smirnov statistical test to see differences in pattern of iodine and thiocyanate consumption in the research area. To see the effect of independent variables on the goiter incidence, a multiple logistic regression statistical test was used.

## RESEARCH RESULTS

### 1. Respondent Characteristics

The characteristics of respondents in this research consisted of age, sex and nutritional status based on the indices of Body Weight/Age, Body Height/Age and Body Weight/Height. Data on characteristics of the respondents were obtained through direct interviews with the respondents. Table 1 shows the characteristics of respondents in the research area.

**Table 1. Frequency Distribution of Respondent Characteristics in Endemic and Non-Endemic Goiter Areas in Jember Regency in Year 2011**

Respondent Characteristics	Endemic Goiter Area (Case)		Non-Endemic Goiter Area (Control)		Total	
	n	%	n	%	N	%
<b>Goiter Grade</b>						
0	-	-	30	100	30	50
Ia	27	90	-	-	27	45
Ib	3	10	-	-	3	5
II	-	-	-	-	-	-
III	-	-	-	-	-	-
Overall	30	100	30	100	60	100
<b>Age</b>						
7-9	7	23.33	1	3.33	8	13.33
10-12	22	73.33	29	96.67	51	85
13-15	1	3.33	-	-	1	1.67
Overall	30	100	30	100	60	100
<b>Sex</b>						
Male	12	40	18	60	30	50
Female	18	60	12	40	30	50
Overall	30	100	30	100	60	100
<b>Nutritional Status</b>						



<b>(Body Weight/Aged)</b>						
Normal	19	63.33	26	86.67	45	75
Thin	8	26.67	2	6.67	10	16.67
Very Thin	3	10	2	6.67	5	8.33
Overall	30	100	30	100	60	100
<b>Nutritional Status (Body Weight/Height)</b>						
Height	-	-	1	3.33	1	1.67
Normal	20	66.67	24	80	44	73.33
Short	6	20	4	13.33	10	16.67
Very Short	4	13.33	1	3.33	5	8.33
Overall	30	100	30	100	60	100

Table 1 shows that the results of most of thyroid enlargement grade in endemic goiter area are 1a; only a small portion is included in grade 1b category. Furthermore, most of the respondents in both research areas were in the age range of 10-12 years. For sex, the number of both male and female was equal, but in endemic goiter areas, the number of female was higher. Nutritional status measured by two anthropometrical indices of Body Weight/Age and Body Weight/Body Height showed that the results were mostly included in the normal category; however, there were children who belonged to thin and very thin categories and also short and very short ones. And the number of them in endemic goiter area was higher.

## 2. Patterns of Iodine Source Food and Goitrogenic Substance Consumption

Data on patterns of iodine source food and Goitrogenic substance consumption were taken using food frequency form. In the food frequency form were iodine source food and goitrogenic substance listed which then to be asked for the consumption frequency of goitrogenic substance by interview technique. Table 2 shows that there is a significant difference in consumption pattern of iodine ( $p = 0.003$ ) and consumption pattern of goitrogenic substance ( $p = 0.035$ ) between endemic and non-endemic goiter areas.

Table 2. Difference in Consumption Patterns of Iodine and Goitrogenic Substance

Variable	Case	Control	p
Consumption Pattern of Iodine			
- Mean	4.23	5.62	0.003*
Consumption Pattern of goitrogenic substance			
- Mean	3.65	5.06	0.035*

\*significant by Kolmogorov Smirnov test



The research results showed that an average score of consumption patterns of iodine and goitrogenic substance in non-endemic area (control) were higher than that in endemic goiter area. This means that iodine- and goitrogenic substance-source foods were more widely consumed in non-endemic goiter area. High iodine consumption pattern in non-endemic area is a common thing, but the thing to anticipate is the high consumption pattern of goitrogenic substances in non-endemic goiter area because it would be a risk factor for the goiter incidence if it occurs in a long time

### 3. Consumption levels of Iodine and goitrogenic Substance

Table 3. Consumption Level of Iodine dan Goitrogenic Substance

Variable	Case	Control	p
Consumption Level of Iodine			
- Mean ( $\mu\text{g}$ ) + SD	0.05 + 0.14	1.44 + 2.43	1.000 <sup>C</sup>
Consumption Level of Goitrogenic			
- Mean ( $\mu\text{g}$ ) + SD	5.92 + 6.45	3.98 + 3.92	0.000 <sup>C</sup> ; 0.356 <sup>R</sup>

<sup>C</sup>= chi square test; <sup>R</sup>= multiple logistic regression test

It can be seen in Table 3 that iodine consumption level is very low in both of the research areas. Both are included in the deficit category. If verified with data on consumption pattern of iodine, it is seen that many major iodine source foods were rarely even never consumed by the respondents, especially seafood.

Actually, the average consumption of goitrogenic substances  $<10 \text{ g} = \text{WHO}$  and  $\text{FAO}$  standard for the consumption of goitrogenic substances (Murdiana and Saidin, 2001); however, there is a tendency of high level consumption (maximum value =  $25.74 \mu\text{g}$  in non-endemic goiter area), so it is necessary to anticipate. Although not significantly affecting the goiter incidence ( $p = 0.356$ ), with low level of iodine consumption, thiocyanate will make things worse and can become a risk factor for the goiter incidence if this situation goes in a long time. At the state of yodida deficit (I-) or low yodida concentration, thiocyanate competes with yodida in entering the membrane of thyroid gland. As described by Murdiana and Saidin (2001), thiocyanate is goitrogenic agent because it is a competitor to yodida to enter thyroid cell membranes.

### 4. Macro Nutrient Substance Consumption Level



The balance of macro nutrients is strongly needed, so the function of each nutrient is not troubled. This balance will occur when we consume food in accordance with the needs of our body. Table 4 shows the consumption levels of macro nutrients in the research area.

Table 4. Consumption Level of Macro Nutrients

Consumption Level	Non Endemic Area		Endemic Area		Total	
	n	%	n	%	N	%
<b>Energy</b>						
• Good	5	16.67	7	23.33	12	20
• Fair	12	40	8	26.67	20	33.33
• Poor	2	6.67	8	26.67	10	16.67
• Deficit	11	36.67	7	23.33	18	30
Overall	30	100	30	100	60	100
<b>Carbohydrate</b>						
• Good	4	13.33	11	36.67	15	25
• Fair	10	33.33	7	23.33	17	28.33
• Poor	12	40	2	6.67	14	23.33
• Deficit	4	13.33	10	33.33	14	23.33
Overall	30	100	30	100	60	100
<b>Fat</b>						
• Good	12	40	4	13.33	16	26.67
• Fair	5	16.67	4	13.33	9	15
• Poor	6	20	4	13.33	10	16.67
• Deficit	7	23.33	15	50	22	36.67
Overall	30	100	30	100	60	100
<b>Protein</b>						
• Good	3	10	3	10	6	10
• Fair	4	13.33	5	16.67	9	15
• Poor	7	23.33	5	16.67	12	20
• Deficit	16	53.33	17	56.67	33	55
Overall	30	100	30	100	60	100

Table 4 shows that most respondents have level of consumption in fair category for energy and carbohydrates, while the level of fat and protein consumption for most of the respondents includes in the deficit category. In Table 5 can the average consumption of each nutrient be seen in both research areas. For the level of energy and carbohydrate consumption, their average consumption is higher in the endemic goiter area, whereas for fat, it is better in non-endemic goiter area, and for protein, it is equal for both of the research areas.

Table 5. Average Consumption of Macro Nutrients

Variable	Case	Control	p
Energy Consumption Level			

- Mean (Kal) + SD	1272.2+428.66	1211.9+380.019	1.000 <sup>C</sup>
Carbohydrate Consumption Level			
- Mean (gr) + SD	202.8+65.57	171.1+62.44	1.000 <sup>C</sup>
Fat Consumption Level			
- Mean (gr) + SD	33.14+18.94	40.8+15.58	1.000 <sup>C</sup>
Protein Consumption Level			
- Mean (gr) + SD	37.94+13.69	37.99+13.96	1.000 <sup>C</sup>

The results of statistical analysis by Chi Square test before the inclusion in the next step to find the effect of the macro nutrients consumption level variable on the goiter incidence obtained  $p > \alpha$ . This means that the variable of macro nutrients consumption levels has no correlation with the goiter incidence, so it is not necessary to test its effect on the goiter incidence. This occurred probably because the two regions had nearly the same level of consumption.

### 5. Level of Iodine and Thiocyanate in Urine

The measurement of consumption levels of urinary iodine and thiocyanate was conducted at the Physiology Laboratory, Faculty of Agriculture, the University of Jember. The results showed that the levels of urinary iodine in the research area were included in the category of fair deficiency, either in non-endemic goiter or in endemic goiter areas. So were the urinary thiocyanate levels which had already been goitrogenic in the two research areas.

Table 6. Urinary Iodine and Thiocyanate Levels

Variable	Case	Control	p
Urinary Iodine Level			
- Mean ( $\mu\text{g/L}$ )+SD	46.15 + 92.50	22.29 + 47.93	0.000* <sup>C</sup> ; 0.355 <sup>R</sup>
Urinary Thiocyanate Level			
- Mean ( $\mu\text{g/L}$ )SD	3.87 + 0.61	4.26 + 0.56	0.010* <sup>C</sup> ; 0.047* <sup>R</sup>

<sup>C</sup>= chi square test; <sup>R</sup>= Multiple Logistic Regression \* = significant

Statistical test results showed a correlation urinary iodine and thiocyanate level and the goiter incidence, but only urinary thiocyanate level affected the goiter incidence ( $p = 0.047$ ).

### DISCUSSION

The low number of respondents who had a thyroid gland enlargement grade Ib was probably due to the effect of iodine capsules provision to all elementary school



students in the Districts of Mayang and Pakusari which are the coverage area of Iodine capsules of Health Department of Jember Regency since they are included in the category of endemic goiter area. Goiter at young age (including elementary school age) reacts very easily and quickly (easily changes) to the iodine intake from outside (Djokomoeljanto in Ningtyias, 2006 and Djokomoeljanto in Pudjadi, 2005:201). However, the enlargement of the thyroid gland grade Ib should be anticipated; if not handled immediately, it will go upper to grade II, considering that the provision program of iodine capsules for School Age Children in Jember Regency has been discontinued since 2010 due to the reason that there is a tendency of the occurrence of iodine excess. It is expected that iodine intake can be fulfilled from iodine source foods and iodized salt consumptions as a long-term prevention program of IDD problem.

Goiter in school-age children should get a special attention because IDD can cause disruption of mental development and intelligence, especially in children (WHO, 2005, PAHO, 2001, Fardiaz, 2005 and Arisman, 2004 in Mutalazimah and Asyanti, 2009). The reduction of intelligence rate by 13.5 IQ point in children suffering from goiter also needs anticipation since it will affect human resources of Indonesian Nation in the future considering that children of school age now are the next generations of Indonesia.

In addition, growth problems are one of results of iodine deficiency since iodine plays a role in metabolism of various nutrients in the body and closely related to growth hormone (Arisman, 2004). It can be seen from the results of research that in endemic goiter area there are more children who have short and very short nutritional status.

Differences in consumption patterns of iodine and goitrogenic substance in both of the regions might be because the access to food was easier in non-endemic goiter area, due to the close location to the market. However, the differences in consumption patterns are unfortunately still insufficient of iodine intake necessities, seen at the level of iodine consumption which is still deficit. What should need to gain an attention is the trend of high level consumption of goitrogenic substances in non endemic area which becomes the risk factors of goiter incidence.

Consumption levels of macro nutrients indirectly affects goiter incidence since protein deficiency affects various stages of hormone formation from thyroid gland, particularly in the stage of hormone transportation (Santoso et al, 2006;

Djokomoeljanto, 2002). Most of energy and carbohydrate consumption levels are in deficit category while fat and protein consumption levels are in deficit category. This was influenced by level and pattern of consumption which are not good from the respondents in the research area who often left breakfast time because it had already become a habit and lunch because they were busy with playing and sometimes a nap. Supports and roles of parents are necessary to change this unacceptable behavior.

The main iodine excretion is by urethra channel (urine), and this way is the key measurement indicator of the amount of iodine intake and status (Picauly, 2002). There is no effect of urinary iodine levels on the goiter incidence. This occurred probably because the urinary iodine levels in the both of the areas were mostly in the category of severe deficiency, although the number of respondents with severe deficiency category was higher in endemic goiter area. It can also be seen on the consumption pattern of iodine source food that many major iodine source foods were rarely even never consumed by respondents in the research area.

Urinary thiocyanate level is a description of goitrogenic substance consumption. The results showed that there was effect of urinary thiocyanate levels on the goiter incidence. Goitrogenic substance inhibits not only active transport of iodine but also oxidation, iodide oxidation and incorporation of oxidized iodine with the amino acid tyrosine to form monoiodotyrosine (MIT) and diiodotyrosine (DIT) as well as the process of coupling mediated by the enzyme thyroid peroxidase (TPO). In addition, goitrogenic substance inhibits the release of thyroid hormones (T3 and T4) into the blood circulation. Hormone thyrotropin can indirectly decrease the synthesis and release of T4 and T3 and thyroid gland involution (Kartasurya, 2006).

## **CONCLUSIONS AND RECOMMENDATIONS**

1. Most of respondents in endemic goiter areas have goiter enlargement grade Ia and are female. Most of them have normal nutritional status according to the indices of Body Weight/Aged and Body Weight/Height and in endemic goiter do more respondents have nutritional status of very thin and very short.
2. There are differences in consumption patterns of iodine source foods; respondents in non-endemic goiter area consume more frequently than those in endemic goiter. All



respondents have levels of iodine consumption in the category of deficit with urinary iodine amount in the category of severe deficiency for most respondents.

3. There are differences in consumption patterns of goitrogenic substance source foods; respondents in non-endemic goiter area consume more frequently than those in endemic goiter area. Most of respondents consume goitrogenic substance source foods in a safe amount, but the result of urinary thiocyanate level is goitrogenic for most respondents.
4. Most of respondents have levels of energy and carbohydrate consumption in the fair category and levels of fat and protein consumption in the deficit category.
5. It is expected that there is an improvement in food consumption patterns and levels of iodine and goitrogenic substance source foods by increasing public knowledge by conducting extensions.
6. The participations of parents are expected to supervise unacceptable habits of frequently neglecting meal time which thus affects the adequacy of food consumption for children.

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