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Determinants Of Disorders Due To Iodine Deficiency (Idd) In Post-Fertile Women Who Live In Endemic Areas In Enrekang Regency

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Abstract

Objective of the research is to discover the Determinants of Disorders Due to Iodine Deficiency (IDD) in Post-fertile Women Who Live in Endemic Areas in Enrekang Regency. This study was an analytical research with cross sectional approach. The subjects of this study were 100 Post-fertile Women. Total Goiter Rate (TGR)/ Tyroid gland examination was performed using palpation method, soil iodine level using titration method. Iodine content of drinking water and Iodine Urine Excretion (EIU) using Ammonium Persulp hate Digestion Method, Iodine and zinc intake using semi-quantitative FFQ. Data analysis using Chi-Square analysis. The result of the study is soil iodine levels ranged from 8.53%-14.09%, the average value was 10.756% and the median was 9.65%, the water iodine content about 0-9 g/L, the average value was 0.34 g/L. . Of the total respondents based on Urine Iodine Excretion (EIU), 42.6% had a deficiency, and 57.4% did not. Based on the examination of the thyroid gland, there was swelling of the thyroid gland as much as 4%, and there is no swelling of the thyroid gland as much as 96%. The results of the bivariate analysis showed that there was no significant relationship between iodine levels in water (p=0.776), maternal diet (p=1,000) and Urine Iodine Excretion (EIU), There was no significant relationship between iodine levels in water (p=1,000), maternal diet (p=1,000) with Total Goiter Rate (TGR). there was no significant relationship between iodine levels in soil, levels of iodine in water, diet (iodine intake) on the incidence of IDD in Enrekang district.

Keywords: IDD, EYU, Water, Soil

Introduction

One of the main health problems in developing countries is the problem of disruption to public health caused by malnutrition. Four nutritional problems that need to be addressed are Protein Energy Deficiency (PED), Vitamin A Deficiency (VAC), Iron Nutritional Anemia and Disorders Due to Iodine Deficiency (IDD) (WHO, 2020). Disorders Due to Iodine Deficiency (IDD) is a health problem that needs attention, because the resulting of social impact is still quite high (Zimmermann MB et al., 2012).

In 1982, it was estimated that there were 30 million people living in areas at risk for Iodine Deficiency Disorders (IDD) in Indonesia. This figure was estimated to have reached 42 million people in 1994. Of the 42

million population, it was estimated that 10 million suffer from goiter, 750,000-900,000 suffer from endemic cretinism, and 3.5 million suffer from other IDD (Ministry of Health, 2003). From the results of the 2006 National IDD mapping survey, the number of IDD prevalence increases from 8.5% in 1998 to 21.5% in 2003 and 26.26% in the 2006 mapping survey. The IDD prevalence based on the TGR in South Sulawesi in 1982 showed the percentage amounted to 24.83%, in 1996-1998 showed a percentage of 10.10%, and in 2003 showed a percentage of 10.50% (Muhilal, et al 2000).

Disorders Due to Iodine Deficiency (IDD) in Indonesia are quite serious with a wide spectrum of problems, and can affect all segments of humans from fetuses to adults. The spectrum of disorders that commonly seen are goiter and keratin, but in fact there are broader disorders in the form of growth disorders and physical weakness such as reproductive failure, hypothyroidism, impaired development of the nervous system, and mental function disorders, which can affect the loss of identical IQ-points with intelligence and productivity (Delange and Hetzel, 2004). Iodine is required for the production of thyroid hormone for brain development (Schroeder AC et al., 2014). Various impacts that occur when iodine deficiency happened it will impact on growth and development inhibition.

Post-fertile Women are susceptible to iodine deficiency because the need for iodine increases substantially during pregnancy. This increase is due to many factors, such as the increased demand for thyroxine (T4) in the mother so that it can support normal metabolism, transport of T4 and iodide from mother to fetus (Rayman MP, 2013) and increased renal clearance of iodide (Lazarus JH, 2011), thus placing Post-fertile Women at high risk of developing a series of functional and developmental disorders commonly known as iodine deficiency disorders (IDD). Based on this increase, the recommended iodine requirement is the Nutrition Adequacy Rate (RDA) for Post-fertile Women (150 g/day).

There are factors that cause IDD. Factors from within the individual (individual internal factors). Heredity is an individual's internal factor was estimated to cause IDD. Parental knowledge and low income (individual external factors in relation to family) so that they are not able to provide nutritious food are also suspected of causing IDD. The level of parental food processing, food consumption patterns of goitrogenic substances and consumption of foods containing iodine and the use of salt are also individual external factors (family).

Despite iodine deficiency is the most important factor in the occurrence of IDD, epidemiological observations conclude that environmental factors have a significant influence on the persistence and development of new cases in various endemic areas. The most important environmental factors are goitrogen agents (Thaha et al, 2002). Iodine deficiency mainly occurs in mountainous areas, in soils which lack iodine.

Based on research conducted by Aspar Abdul Gani 2007, it showed that the EIU and ETU variables have a risk of OR=2,857 and OR=1,221, respectively. Iodine in the soil has protective factors, respectively OR=0.383 and OR=0.048, the results of multivariate analysis showed that the EIU variable had a greater effect than ETU on the incidence of goiter. The results of the analysis of the differences between the case and control groups showed that from the five variables (urinary iodine excretion, urinary thiosinate excretion, iodine in salt, iodine in soil, and iodine in water) that were tested only iodine in soil was significantly different with p value = 0.010 (<0.05).

Djokomoeljanto (1994) stated that deficiency is the main cause of endemic IDD, in general IDD was found in mountainous areas because the food consumed is very dependent on food production from local plants that grow in conditions of low iodine levels on local agricultural soils. This is because the iodine content in the soil is carried by water to lower areas, Enrekang Regency is an area that generally has a varied topography in the form of hills, valleys and mountains, which is about 84.86% of the total area while the flat is only about 15.04 %. So that people who live in the Enrekang area are very at risk of experiencing iodine deficiency.

Based on the things above, it is suspected that there are IDD risk factors for stunting in Enrekang, the researchers are interested in examining the determinants of Iodine Deficiency Disorders (IDD) with risk population, namely Post-fertile Women who live in IDD endemic areas in Enrekang Regency.

Methods

This study was an analytical research with cross sectional approach. The subjects of this study were 100 Post-fertile Women. Total Goiter Rate (TGR)/Tyroid gland examination was performed using palpation method, soil iodine level using titration method. Iodine content of drinking water and Iodine Urine Excretion (EIU) using Ammonium Persulphate Digestion Method, Iodine and zinc intake using semi-quantitative FFQ. Data analysis using Chi-Square analysis.

Results and Discussion

There were 100 Post-fertile Women included in this study. Table 1 shows a table of data characteristics of the frequency distribution of Post-fertile Women. Table 2 shows the frequency of thyroid gland palpation, soil iodine levels, drinking water iodine levels, Urine Iodine Excretion (EIU), and diet. Table 3 shows the relationship between soil iodine levels, drinking water iodine levels, diet and thyroid gland palpation. Table 4 shows the relationship between soil iodine levels, drinking water iodine levels, diet and thyroid gland palpation. The results of the study, based on the content of drinking water with the thyroid gland, showed that the value of p = 1,000 (P > 0.05) had no relationship between the content of iodine in the water and palpation of the thyroid gland. Similarly, based on the content of drinking water with Urine Iodine Excretion, it showed p value = 0.776 (P > 0.05) there was no relationship between Iodine content in water and Urine Iodine Excretion

Table 1 Univariate Analysis Results based on Characteristics of Post-fertile Women

Variable	Frequency (n)	Percentage (%)
Age		
16 - 20 Years Old	11	11
21 - 25 Years Old	22	22
26 - 30 Years Old	27	27
31 - 35 Years Old	20	20
36 - 40 Years Old	12	12
41 - 45 Years Old	6	6
46 Years Old	2	2
Mother's Education		
Uncompleted Elementary School	2	2
Elementary School	15	15
Junior High School	40	40
Senior High School	29	29
Diploma	5	5
Bachelor Degree	9	9
Mother's Occupation		

Housewife	91	91
Trader	1	1
Honorary	7	7
ASN/TNI/POLRI/BUMN/BUMD	1	1
Household Income		
Rp. 1.000.000 - Rp. 2.000.000 / Month	65	65
Rp. 3.000.000 - Rp. 4.000.000 / Month	31	31
Rp. 5.000.000 - Rp. 6.000.000 / Month	3	3
> Rp. 6.000.000 / Month	1	1
Mother's LILA		
KEK (≤23,5 cm)	7	7
Normal (>23,5)	93	93
Mother's IMT		
Thin (<18,4)	7	7
Normal (18,5-25,0)	56	56
Fat (>25,1)	37	37
Drinking Water Resources		
Water refill	2	2.0
Protected springs	98	98.0

Table. 2 Thyroid Gland Palpation Frequency, Soil Iodine Level, Drinking Water Iodine Level, Urine Iodine Excretion (EIU), and Diet

Variable	Frequency (n)	Percentage (%)
Maternal Thyroid Gland Palpation		
Palpable but not visible	3	3
Obvious swelling occurs	1	1
No goiter	96	96
Iodine Levels in Soil		
Enough	100	100
Iodine Levels in Water		
Less	97	97
Enough	3	3
EIU		
Less	42	42
Enough	58	58
Mother's Diet		
Less	67	67

Enough	33	33
Total	**100**	**100**

Source: Primary Data, 2021

Table. 3 Bivariate Analysis of Soil Iodine Levels, Iodine Levels of Drinking Water, Diet with Thyroid Gland Palpation

Variable	Thyroid Gland				Total		P-Value
	With Goiter		No Goiter				
	n	%	n	%	N	%	
Iodine in Soil							
Less	-	-	-	-	-	-	-
Enough	4	4	96	96	100	100	
Iodine in Water							
Less	4	4.1	93	95,9	97	100	1,000
Enough	0	0	3	96	3	100	
Diet (Iodine Intake)							
Less	4	4	96	96	100	100	-
Enough	-	-	-	-	-	-	
Total	**4**	**4**	**96**	**96**	**100**	**100**	

Source: Primary Data, 2021

Table. 4 Bivariate Analysis of Soil Iodine Levels, Iodine Levels in Drinking Water, Diet with Urine Iodine Excretion (EIU)

Variable	Thyroid Gland				Total		P-Value
	With Goiter		No Goiter				
	n	%	n	%	N	%	
Iodine in Soil							
Less	-	-	-	-	-	-	-
Enough	42	42	58	58	100	100	
Iodine in Water							
Less	40	41.2	57	58.8	97	100	0,776
Enough	2	66.7	1	33.3	3	100	
Diet (Iodine Intake)							
Less	42	42	58	58	100	100	-
Enough	-	-	-	-	-	-	
Total	**4**	**4**	**96**	**96**	**100**	**100**	

Source: Primary Data, 2021

Table 1 shows that the most maternal age is 26-30 years old, as many as 27 people (27%). Mother's religion is 100% Muslim. Most of the mothers' education was junior high school graduates, as many as 40 people (40%). Most of the mothers' occupations are housewives, as many as 91 people (91%). The highest income is Rp. 1,000,000 – Rp 2,000,000/Month for 65 people (65%). LILA Most of the mothers were Normal as many as 93 people (93%). The highest body mass index was in the normal category, as many as 56 people (56%). The most drinking water sources are protected springs as many as 98 people (98%).

This is in line with Reni Rahayu et al 2015. It shows that there is almost no difference in the level of education of respondents in the Musuk I Public Health Center, Boyolali Regency, based on the type of work, it shows that most of the respondents (76.3%) do not work. Based on family income, it shows that mothers with low family income are 44.7%.

From Table 3. the percentage of respondents who have insufficient iodine in water and do not have a goiter are 93 people (95.9%) and respondents who have sufficient iodine in water and have a goiter are 0 people (0%). Then P> 0.05, examining that there is no relationship between the level of iodine in the water and the thyroid gland in post-fertile women who live in endemic areas in Enrekang Regency.

From Table 4. the highest percentage of respondents are respondents who have insufficient iodine in water and have sufficient EIU category as many as 57 people (58.8%) while the least percentage are respondents who have sufficient iodine in water and have sufficient EIU category, namely as many as 1 person (33.3%). Based on the results of the Chi-Square statistical test, P>0.05, it means that there is no relationship between iodine levels in water and EIU in post-fertile women living in endemic areas in Enrekang Regency.

Adequate levels of iodine in the soil can affect the iodine content found in plants and crops on agricultural land, so as to reduce the risk of iodine deficiency in Enrekang district. However, disturbances due to iodine deficiency, which are often found in mountainous areas, contain low levels of iodine in soil and drinking water sources (Stanbury, 1987). Since all crop yields obtained from plants grown on soils that are lack of iodine will be deficient in iodine, as a result, human and animal populations that are totally dependent on these plants will also be deficient in iodine. (Hetzel et. al., 1996; Tezic. 1998. In Picauly. 2006).

It is still found that many goiter sufferers in various places are associated with food that is consumed continuously and lasts a long time from the production of food from the soil with low iodine content, so that the problem of goiter in the community is still often associated with low consumption of iodine from food and beverages in people in mainland areas or mountainous.

This is in line with research conducted by Aspar Abdul Gani 2007, The results of the inter-group analysis showed that the OR value = 0.048, this means that the iodine content in the soil in the goiter area can be a protective factor against the occurrence of goiter with the assumption that foodstuffs grown in The area is consumed by the people who live in this area.

The factor that is thought to play a role in the incidence of IDD is iodine deficiency in drinking water. In the long term, iodine deficiency is at risk of causing goiter through the mechanism of iodine intake being too low, causing the thyroid gland to be unable to maintain adequate hormone secretion, resulting in disturbances due to iodine deficiency.

This is in line with the research of Mutalazimah and Setia Asyanti showed that there is a tendency for the percentage of subjects who experience goiter to be greater than those who use water sources with insufficient iodine levels, on the contrary, the percentage of subjects who do not suffer from goiter is

greater in those who use water sources with sufficient iodine levels. . However, statistically through the Chi Square test, no significant relationship was found (p = 0.077).

Based on the diet, in general, foodstuffs contain a certain amount of iodine, however, the content of iodine in foodstuffs varies from region to region (Thaha, 2002). According to research conducted by Djokomoeljanto (1994) in general, IDD patients are mostly found in hilly or highland areas, where the content of iodine in food (vegetables) that grows in the area and drinking water consumed by local residents is low (Adriani & Wirjatmadi , 2002).

It caused by the consumption of iodine in individuals which varies from day to day and environmental conditions such as the presence of goitrogen compounds which can affect the persistence and development of new cases. In addition, the presence of various substances that affect iodine metabolism can also affect the incidence, severity, and prognosis of IDD (Satoto, 2002).

This is in line with the results of Hafni Rizalia's research. From the statistical test results, there is a significant relationship between consumption of iodine-sourced foods, consumption of goitrogenic sources of food and the incidence of Iodine Deficiency Disorders.

Conclusion

Adequate intake of nutrients plays an important role in urinary Iodine Excretion and Disorders Due to Iodine Deficiency. In this study, there was no relationship between iodine levels in soil, iodine levels in drinking water, diet with Iodine Urine Excretion and Thyroid Gland Palpation.

Conflict of interest

The authors declare no conflict of interest.

Confession

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