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RESEARCH ARTICLE
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Effects of Giving Iodized Salt, Counseling of Iodine and Goitrogenic Sources of Food in Mothers Who Have Elementary School Children Against Urinary Iodine Excretion

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ABSTRACT

As a result of IDD is the occurrence of impaired child growth makes researchers interested in conducting research on "Provision of iodized salt, food counseling about the source of iodine and goitrogenic substances with urinary iodine excretion status in elementary school children". Research on IDD is often carried out in primary school-age children, aged 6-12 years because of their vulnerability to iodine deficiency. The purpose of this study was to determine the effect of iodized salt interventions and counseling patterns of iodized and goitrogenic food consumption patterns on levels of urinary yodiun excretion in families with elementary school children. Research methods: The design of this study included quasi-experimental using a specific design that is "pre and post test control group design". The study population was elementary school children with a sample size of 30 children aged 9 -12 years in each group. Data collected included the consumption of nutrients by the 24-hour recall method, the results of urine iodine examination by the spectrophotometric method. The collected data is then analyzed with an independent sample T test. The results showed there were differences in urinary yodiun excretion levels in the two groups (treatment and control), while the mean in the treatment group before intervention was 106.97 ug / L and after the intervention was 43.19 ug / L. Whereas in the control group, the level of urinary yodiun excretion before intervention was 117.30 µg / L and after the intervention was 243.19 µg / L. The mean of respondents who consumed goitrogenic sources in the treatment group before the intervention (Yes = 63%, No = 37%), after the intervention (Yes = 23%, No = 77%). Whereas in the Control group before the intervention (Yes = 56%, No = 73%), after the intervention (Yes = 23%, No = 77%). The average amount of protein consumption before treatment was 47.91 µg/L ± 6.54 and 50.15 µg/L ± 12.52 after treatment. For consumption, an increase with a mean before treatment was 89.88 µg/L ± 38.45 and after treatment was 113 µg/L ± 26. The results of the independent sample t-test showed that in the treatment group there was no significant difference between after and before the intervention (p = 0.058). Whereas in the control group there were significant differences between before and after the intervention (p = 0.002). It can be concluded that there are many factors that need to be controlled in the provision of interventions, especially the use, type of salt and goitronic as well as the method of examination of iodine analysis in urine.

Keywords: iodized salt; iodine food sources; goitrogenic; urinary iodine excretion

INTRODUCTION

Background

Iodine Deficiency Disorders (IDD) not only result in endemic goiter and cretinism, but also affect the decrease in resistance to disease, brain development (intellectual) which is hampered and potentially reduce the level of intelligence or Intelligence Quotient (IQ), low productivity, and even born physically and mentally disabled as well as growth disorders.(1) As a result of IDD which is a disruption to the growth of children, made researchers interested in conducting research on "The effect of iodized salt delivery and Food Extension of Iodine Sources and Goitrogenic Substances with excretion of iodine iodine in elementary school children".

Research on IDD is often carried out in primary school-age children, aged 6-12 years because of their vulnerability to iodine deficiency. Children at this age are in a period of growth and development, so that attention to nutrition of school children is a strategic step, because the impact is directly related to the achievement of quality human resources.

Purpose

To overcome the problem of iodine deficiency need treatment efforts to the community through "Provision of iodized salt, counseling food sources of iodine and goitrogenic food". The goal is to change the consumption of iodized and goitrogenic food sources and to consume the recommended iodized salt so that iodine intake is fulfilled and urinary iodine excretion becomes normal.

METHODS

The study was conducted in the village of Sedau Kec. Narmada in Elementary School Children Age 9-12 years or grades 4-6, from May to August 2017. The research design used was "pre and post test with control group design. Each sample size was 30 people, both in the treatment group and the control group. In the treatment group, the mother was given iodized salt, counseling for iodine food sources and goitrogenic food sources.

The parameters measured were the consumption of iodine, protein, urinary iodine excretion before being treated and after being treated with a span of time for 3 weeks. Data collection of nutrient consumption is done by doing a 24-hour recall, analysis of urinary iodine by spectrophotometry and consumption of goitrogenic sources by observation during a recall. To assess the effect of treatment an independent sample t test was performed.

RESULTS

Analysis of differences in urinary iodine excretion in the treatment group before and after treatment and the control group before and after the treatment is attached.

Characteristics of Research Subjects

The characteristics of the subjects in this study can be seen in table 1 and table 2. The subjects of the study were elementary school children grades 4-6 and most (80% - 90%) were aged 10 to 12 years. This age was chosen to be easier to communicate with, especially regarding food consumption, and the number for each group was 30 students.

Table 1. Characteristics of the research sample (gender)

Gender	Intervention		Control	
	Frequency	Percentage	Frequency	Percentage
Male	15	50	20	66.7
Female	15	10	10	33.3
Total	30	100	30	100

Table 2. Characteristics of the research sample (gender)

Age	Intervention		Control	
	Frequency	Percentage	Frequency	Percentage
<10 years	6	20	3	10
10-12 years	24	80	27	90
Total	30	100	30	100

Consumption of Goitrogenic Substances

Table 3. Consumption of goitrogenic food sources in the treatment group

Age	Before		After	
	Frequency	Percentage	Frequency	Percentage
Yes	22	73	7	23
No	8	27	23	77
Total	30	100	30	100

Table 4. Consumption of goitrogenic food sources in the control group

Age	Before		After	
	Frequency	Percentage	Frequency	Percentage
Yes	19	63	17	56
No	11	37	13	44
Total	30	100	30	100

Goitrogenic is a substance that can inhibit the production or use of thyroid hormone. Substances that are goitrogenic are contained in many food ingredients, such as cassava, sweet potatoes, cabbage, beans and mustard greens. In this study it was found that the consumption of goitogenic sources was in accordance with the results of recall and observation in the treatment group after counseling about iodized and goitrogenic food sources, from 73% to 23% after the mother was given counseling. Whereas in the control group the observation result of the first recall result of goitrogenic consumption was 63% and decreased to 56%.

Iodine consumption

The amount of iodine excretion in the treatment and control group was obtained from the results of laboratory analysis, after sampling in the morning with the container provided by the researcher. The results of urinary iodine excretion can be seen in the following table.

Table 5. The levels of urinary iodine excretion in the treatment group

	n	Mean	SD	P
Before	30	97.29	29	0.00
After	30	239.08	871	

Table 6. The levels of urinary iodine excretion in the control group

	n	Mean	SD	P
Before	30	117.30	11.85	0.00
After	30	243	92.2	

There is a difference in the level of urinary iodine excretion in children whose mothers are given iodized salt, counseling treatment about iodine source food and goitrogenic food with elementary school children whose mother is in control (p = 0.00), where the mean urinary iodine excretion of children whose mother is treated is 97 , 29 µg / L ± 29 and increased to 239.0829 µg / L ± 87.1; while the control group was 117.30 µg / L ± 11.85 increasing to 243 µg / L ± 92.2. The intake of iodine in daily food affects the adequacy of iodine in the body, the results of the 24-hour recall in the treatment group did not differ statistically but the average increased from 89.88 µg / L ± 38.45 to 113 µg / L ± 26.4 whereas in the control group was statistically different from the mean 92 µg / L to 114 µg / L; but according to the adequacy rate of iodine a day recommended.[(2),(3)]

Protein Consumption

Protein requirements related to amino acids needed by the body, in addition to growth, are also needed to produce important molecules in the body, such as enzymes, hormones, neurotransmitters (chemical compounds in the brain). The following table presents the level of protein intake through 2 x 24 hour recall in elementary school children, both in the control group and the treatment group.

Table 7. Distribution of protein consumption in elementary school children

Category	Treatment group				Control group			
	Before		After		Before		After	
	n	%	n	%	n	%	n	%
Minor deficits	21	70	17	56	25	83	24	80
Normal	9	30	10	33	5	17	6	20
Above adequate	0	0	3	11	0	0	0	0
Total	30	100	30	100	30	100	30	100

Protein deficiency can affect various stages of hormone formation from the thyroid gland especially the hormone transport stage. Both T3 and T4, both bound by protein in serum, are only 0.3% T4 and 0.25% T3 free.[(4)] Protein deficiency will cause high T3 and free T4, with a feedback mechanism in TSH, the hormones from the thyroid gland eventually decrease. In this study in particular the treatment group, there was a significant difference (p <0.05) between before and after the administration of the intervention, and this was also shown by an increase in the mean protein intake from 47.91 µg/L ± 6.54 to 50.15 µg/L ± 12.52; whereas in the control group there was almost no change.

Urinary Iodine Excretion

Analysis of differences in urinary iodine excretion in the two groups is presented in the table. The results of the analysis showed that the administration of iodized salt, counseling of iodine and goitogenic food sources to mothers who had primary school children had a significant effect (p <0.05) on urinary iodine excretion, where the mean and standard deviation of urinary iodine excretion before being treated was 97.29 µg/L ± 29 µg/L, finally increased to 238 µg/L ± 87 after being treated.

DISCUSSION

All respondents of this study were mothers who had primary school children in both the treatment and control groups. The research subjects were elementary school children grades 4 - 6. From the results of data analysis, it turns out that the age of the study subjects in the treatment group was mostly 10-12 years (80%) and the control group with the same age was (90%). This age was chosen with consideration that it is easier to be invited to communicate, especially regarding food consumption.

Goitrogenic is a substance that can inhibit the production or use of thyroid hormone. Substances that are goitrogenic are contained in many food ingredients, such as cassava, sweet potatoes, cabbage, beans and mustard greens. In this study it was found that the consumption of goitogenic sources was in accordance with the results of recall and observation in the treatment group after being counseled about iodized and goitrogenic food sources, from 73% to 23%. Whereas in the control group the observation result of the first recall of goitrogenic consumption was 63% and decreased to 56%.

There are different levels of urinary iodine excretion in children whose mothers are given iodized salt. The treatment of counseling about iodine source food and goitrogenic food in elementary school children as a control value of $p = 0.00$. The mean excretion of urine iodine of children whose mothers were treated was 97.29 µg / L ± 29 and increased to 239.088 µg / L ± 87.1; whereas in the control group it was 117.30 µg / L ± 11.85 and increased to 243 µg / L ± 92.2. The intake of iodine in daily food affects the adequacy of iodine in the body, the results of 24-hour recall in the treatment group did not differ statistically but the average increased from 89.88 µg / L ± 38.45 to 113 µg / L ± 26.4; whereas in the control group there were statistical differences with the mean 92 µg / L to 114 µg / L; but according to the adequacy of the daily iodine number recommended.[(2),(3)]

Protein deficiency can affect various stages of hormone formation from the thyroid gland, especially the phase of hormone transport, both T3 and T4 which are bound by protein in serum, only 0.3% T4 and 0.25% T3 are free.[(4)] Protein deficiency will cause high T3 and free T4, with a feedback mechanism in TSH, the hormones from the thyroid gland eventually decrease. In this study, especially the treatment group there was a significant difference ($p < 0.05$), before and after being given an intervention and this was also shown by an increase in the mean protein intake from 47.91 µg / L ± 6.54 to 50.15 µg / L ± 12.52. Whereas in the control group almost no change.[(5)] Poor protein consumption, especially related to iodine, has nothing to do with the incidence of menarche in adolescents aged 12 years.

Analysis of differences in urinary iodine excretion in the two groups showed that administration of iodized salt, iodine and goitogenic food counseling to mothers with primary school children had a significant effect on urinary iodine excretion, where the mean and standard deviation of urinary iodine excretion before treatment was 97, 29 µg / L ± 29 µg / L; and urinary iodine excretion increases to 238 µg / L ± 87 after treatment.[(6)] Iodine intake is associated with urinary iodine excretion but goiter is not related to iodine intake.

CONCLUSION

Based on the results of the study it can be concluded that the administration of iodized salt, counseling food sources of iodine and goitrogenic affect the urinary iodine excretion of elementary school children, both in the treatment and control groups in Sedau Village, Narmada District, West Lombok Regency.

For further research it is recommended that confounding factors must be strictly controlled such as goitrogenic, Fe, selenium and urine sampling for examination of urine iodine excretion should be done at night.

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