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THE LEVEL OF NUTRITION KNOWLEDGE IN WOMAN WITH DIAGNOSED THYROID DISEASES

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Abstract. The aim of the study was an estimation of the level of nutrition knowledge on iodine deficiency in woman with diagnosed thyroid diseases and its comparison with healthy woman's knowledge. The study was conducted by direct interview method among 400 women – 200 patients of the Clinic of Thyroid Diseases in Poznan (Poland) and 200 "healthy" individuals (thyroid diseases were not diagnosed). Respondents were asked to give their opinion to the sequence of statements relating to iodine deficiency prophylaxis. A sufficient level of knowledge was found in terms of basic issues concerning iodine deficiency, i.e. the role of iodine in the thyroid gland functioning and its sources in the diet. However, both in the group of patients and healthy individuals, a low level of knowledge was found connected with the effect of thermal processing on iodine content in food and food limiting the iodine supply. The level of nutrition knowledge in woman with diagnosed thyroid disease was higher than in healthy woman. Due to the role of knowledge on factors limiting the iodine supply from the diet for the effectiveness of iodine deficiency prophylaxis, it is essential to include them in nutrition education.

Key words: thyroid diseases, women, nutrition knowledge, iodine sources, factors limiting the iodine supply

INTRODUCTION

Nutrition education is an element of health promotion targeting individual people within a population. It includes both the promotion of knowledge on human nutrition among the general public and training specialists dealing with nutrition in their professions [Usinger-Lesquerex 1994]. In modern approach it is believed that its aim is not only to disseminate knowledge on what is and what is not advantageous for our health, but also to develop skills and habits facilitating effective utilization of this knowledge. In Poland nutrition education is essential in view of the still insufficient level of knowledge on appropriate nutrition.

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Proper nutrition is the basic method to prevent numerous diseases, including thyroid diseases, being to a large extent an effect of iodine deficiency [The World... 2002]. The role of iodine in human physiology results from the participation of this element in the synthesis of thyroid hormones, controlling numerous metabolic changes. Thus its deficiency leads to the development of many disorders, referred to as Iodine Deficiency Disorders [Hetzel 1983, 1989]. One of the more dangerous consequences of iodine deficiency is subclinical hypothyroidism during pregnancy and early infancy, causing considerable risk of brain damage and irreversible debilitation of neuropsychointellectual development of offspring [Hetzel 2000].

The problem of iodine deficiency is still pressing in many countries [Benoist and Clugstron 2002, Dunn 2003, Benoist et al. 2003]. In order to reduce iodine deficiency at the population level the National Program to Eliminate Iodine Deficiency was initiated in Poland in the 1990's [Szybiński and Lewiński 1998]. Its consequence was the introduction in 1997 of the obligation to iodination of table salt for human consumption at level of 30 mg KI/kg (2.3 mg I/kg). Thanks to this regulation the incidence of iodine deficiency diseases was reduced in Poland [Szybiński et al. 2001, Grzesiuk et al. 2002, Gołkowski et al. 2003]. However, there are still reports from some regions of Poland concerning insufficient contents of iodine excreted with urine in populations at an especially high risk of iodine deficiency, e.g. pregnant women [Szybiński 2005, Bodzek et al. 2006] and children [Brodowski et al. 2006, Bączyk et al. 2006], in spite of iodination of table salt. Thus it is believed that the National Program to Eliminate Iodine Deficiency needs to be continued and developed in Poland, together with educational activities conducted within its framework. In relation with this fact it is crucial to verify whether educational activities performed so far within the framework of iodine deficiency prevention have brought satisfactory results in an adequate level of knowledge on iodine deficiency, especially in those groups, in which this problem is most pressing.

The aim of this study was to determine the state of knowledge on iodine deficiency in woman with diagnosed thyroid diseases (especially the role of iodine in the functioning of the thyroid gland, iodine sources in the diet and factors limiting the supply of this element in the diet) and comparison at the level of knowledge in these women with healthy women's knowledge.

MATERIALS AND METHODS

Investigations were conducted between November 2006 and March 2007 on a group of 400 women, including 200 patients of the Clinic of Thyroid Diseases in Poznań with diagnosed thyroid diseases – a group of patients and 200 individuals, in those the above mentioned diseases were not diagnosed – a group of healthy individuals (control). The method of purposive (non-random) sampling was used for respondents' selection. Both analysed groups were selected to ensure they were similar in terms of demographic characteristics (age, place of residence) and socio-economic factors (education, income) – Table 1.

The method of direct interview was used in the study. A questionnaire was applied, which contained questions on the role of iodine for the proper functioning of the thyroid gland, iodine sources in the diet and factors reducing the supply of this element in the diet. The above questions had the form of statements. During the interview respondents

Table 1. The demographic and economic structure of analysed population
Tabela 1. Struktura demograficzna i ekonomiczna badanej populacji

Demographic and economic characteristics Cechy demograficzne i ekonomiczne	Percentage of respondents Procent respondentów	
	group of patients grupa chorych (n = 200 = 100%)	group of healthy individuals grup zdrowych (n = 200 = 100%)
Age – Wiek		
18-30 years – 18-30 lat	33	32
31-45 years – 31-45 lat	38	36
over 46 years – powyżej 46 lat	30	33
Place of residence – Miejsce zamieszkania		
city – miasto	67	62
town – miasteczko	20	17
village – wieś	13	22
Education – Wykształcenie		
elementary – podstawowe	3	5
vocational – zawodowe	20	21
secondary – średnie	47	44
incomplete higher – wyższe niepełne	19	12
higher – wyższe	12	19
Income – Dochód		
high – wysoki	53	46
low – niski	47	54

were read each statement twice and next they were asked to give their opinion by selecting one of the following responses: I agree totally, I agree, I am not sure (I don't know), I don't agree, I don't agree at all [the Likert scale: Munshi 1990]. In order to reduce the randomness of responses, knowledge on some issues was verified using two conflicting statements.

Several hypotheses (H_0) were proposed on independence between the type of responses given by respondents and the diagnosis of the thyroid disease. In order to verify the hypotheses the responses were divided into three categories: an incorrect response, "I don't know", a correct response, while the results obtained for the group of patients and healthy individuals were compared. Next statistical analysis was conducted using the chi-square independence test at $\alpha = 0.05$ [Danzard 1986]. In case hypothesis H_0 was rejected an alternative hypothesis (H_1) was adopted on the existence of dependence between awareness of having a thyroid disorder and the level of nutrition knowledge. This means that being aware of the disease affects responses given by respondents.

RESULTS

Responses to questions concerning the role of iodine for human organism and its sources in the diet

On the basis of the results (Table 2), considerable knowledge on the role of iodine for the human organism was found in both analysed groups. However, a larger percentage of respondents with diagnosed thyroid diseases (88%) than respondents, in which these disorders were not diagnosed (79%), knew that iodine is a component of thyroid hormones (question 4). Moreover, 2 times more healthy individuals than patients could not answer this question.

Table 2. Analysis of the dependence between the type of responses given by respondents and awareness of having a thyroid disorder
Tabela 2. Analiza zależności pomiędzy rodzajami odpowiedzi udzielonymi przez respondentów i ich wiedzą o chorobie tarczycy

Questions Pytania		Responses – Odpowiedzi %			χ^2 test		
		wrong zła	I don't know nie wiem	right dobra	calculated value wartość obliczona	critical value wartość krytyczna ($\alpha = 0.05$)	hypothesis* hipoteza*
1		2	3	4	5	6	7
Questions concerning the role of iodine for human organism and its sources in diet Pytania dotyczące znaczenia jodu dla organizmu człowieka oraz jego źródeł w diecie							
1. Iodine is found in drinking water 1. Jod występuje w wodzie pitnej	patients chorzy	27.5	26.0	46.5	3.86	4.30	H_0 independent niezależne
	healthy zdrowi	34.0	29.0	37.0			
4. Iodine is contained in thyroid hormones 4. Jod wchodzi w skład hormonów tarczycy	patients chorzy	5.0	7.0	88.0	6.59	4.30	H_1 dependent zależne
	healthy zdrowi	6.5	14.5	79.0			
5. A higher iodine content is found in saltwater than fresh-water fish 5. Większa zawartość jodu jest w rybach morskich niż słodkowodnych	patients chorzy	5.0	15.1	79.9	23.81	4.30	H_1 dependent zależne
	healthy zdrowi	4.5	29.0	66.5			
6. In Poland table salt is most frequently fortified with iodine 6. W Polsce najczęściej wzbogaca się w jod sól kuchenną	patients chorzy	10.0	7.0	83.0	15.78	4.30	H_1 dependent zależne
	healthy zdrowi	4.5	19.0	76.5			
9. In Poland margarines are fortified with iodine 9. W Polsce wzbogaca się w jod margaryny	patients chorzy	14.0	43.0	44.0	0.76	4.30	H_0 independent niezależne
	healthy zdrowi	13.0	47.0	40.0			

Table 2 – cd.

1		2	3	4	5	6	7
10. The highest contents of iodine are found in fresh-water fish 10. Najwięcej jodu zawierają ryby słodkowodne	patients chorzy	11.0	17.5	71.5	26.45	4.30	H_1 dependent zależne
	healthy zdrowi	11.5	40.0	48.5			
Questions concerning factors affecting iodine supply in the diet Pytania dotyczące czynników ograniczających podaż jodu w diecie							
2. Large amounts of coffee and tea do not affect iodine absorption 2. Duże ilości pitej kawy i herbaty nie wpływają na wchłanianie jodu	patients chorzy	26.0	26.0	48.0	7.75	4.30	H_1 dependent zależne
	healthy zdrowi	15.6	34.7	49.7			
3. Consumed vegetables of *Cruciferae* family do not have an effect on iodine balance of the organism 3. Spożywanie warzyw z rodziny krzyżowych nie ma wpływu na gospodarkę jodową organizmu	patients chorzy	19.0	32.0	49.0	9.06	4.30	H_1 dependent zależne
	healthy zdrowi	16.5	46.5	37.0			
7. Vegetables of *Cruciferae* family accelerate iodine absorption 7. Warzywa z rodziny krzyżowych przyspieszają wchłanianie jodu	patients chorzy	23.0	43.0	34.0	15.49	4.30	H_1 dependent zależne
	healthy zdrowi	16.5	62.5	21.0			
8. The type of thermal processing does not affect iodine losses during preparation of meals 8. Rodzaj obróbki cieplnej nie wpływa na straty jodu podczas przygotowywania posiłków	patients chorzy	21.5	34.5	44.0	3.30	4.30	H_0 independent niezależne
	healthy zdrowi	17.0	43.0	40.0			
11. Consumption of soy and peanuts lowers iodine absorption in the organism 11. Spożywanie soi i orzeszków ziemnych obniża wchłanianie jodu w organizmie	patients chorzy	14.5	73.5	12.0	4.20	4.30	H_0 independent niezależne
	healthy zdrowi	21.5	64.4	14.0			

*Hypothesis on independence (H_0) or dependence (H_1) between nutrition knowledge (i.e. the type of responses given by respondents) and the diagnosis of thyroid disease.

*Hipotezy o niezależności (H_0) lub zależności (H_1) pomiędzy wiedzą żywieniową (tj. rodzajami odpowiedzi udzielonymi przez respondentów) i zdiagnozowaniem chorób tarczycy.

A similar distribution of responses was observed in case of the question on iodination of table salt – in both analysed groups most respondents could say that in Poland primarily table salt is enriched with iodine, with a higher percentage of correct responses obtained in the group of patients (question 6). In case of both questions statistical analysis confirmed a relationship between knowledge on the thyroid disease and the type of responses given in the interview (hypothesis H_1 was adopted). However, it needs to be stressed that respondents had problems with answering the question concerning iodination of other foodstuffs – almost 50% could not say whether other foodstuffs are also enriched with iodine in Poland, such as e.g. margarine (question 9).

Investigations showed that respondents from the group of individuals with diagnosed thyroid disorders had extensive knowledge on iodine contents in fish. Over 70% respondents in this group could give correct opinions on statements concerning iodine content in saltwater and fresh-water fish. In contrast, healthy individuals had limited knowledge in this respect – e.g. a half of this group believed incorrectly that fresh-water fish contain the biggest amounts of iodine, while 40% could not answer this question at all (question 10). In case of both questions concerning fish as a source of iodine in the diet the biggest differences in answers were observed between respondents from the group of healthy and diseased individuals. These differences were also confirmed statistically (hypothesis H_1 – Table 2).

Respondents showed the most limited knowledge on the presence of iodine in water. Only approx. 1/3 individuals, irrespective of the group (H_0), knew that iodine is found in drinking water. The others gave an incorrect response or could not give any opinion on this statement.

Responses to questions concerning factors affecting iodine supply from the diet

An analysis of questions concerning factors affecting iodine supply in everyday diet (Table 2) showed that respondents had limited knowledge in this respect. Less than 50% respondents, both in the group of patients and healthy individuals, knew that drinking a lot of coffee and tea limit iodine supply from everyday diet. Even worse results were recorded in case of questions concerning the effect of consumption of vegetables from *Cruciferae* family (e.g. cabbage, cauliflower) on the absorption of iodine supplied in the diet. When analysing answers given to the two statements concerning the effect of vegetables from *Cruciferae* family on the absorption of iodine by the organism it was found that approx. 1/3 respondents had knowledge on the subject. At the same time, as many as 43% patients and 62% healthy individuals could not give an opinion on the false statement that cruciferous plants accelerate iodine absorption (question 8). In case of questions concerning the above mentioned issues a significant correlation was found between being aware of the thyroid disease and given answers (hypothesis H_1) – in individuals with a diagnosed thyroid disease a higher percentage of respondents could give correct answers to the above mentioned questions.

In individuals participating in the study a low level of knowledge was also found in terms of factors limiting the supply of iodine from the diet. Both diseased and healthy individuals showed a lack of knowledge on the effect of the consumption of soy and peanuts on iodine supply – only a slight percentage of respondents knew that their consumption may affect iodine balance in the organism and limit the synthesis of thyroid hormones. Approx. 40% respondents in both analysed groups knew that the type of thermal processing affects losses of iodine during the preparation of meals, but at the same time a similar number of respondents did not have any knowledge on the subject and chose the "I don't know" answer. In both cases no relationship was found between the diagnosed thyroid disease and the type of given answers (hypotheses H_0 were adopted – Table 2).

Insufficient knowledge on factors affecting iodine supply was confirmed by the analysis of results concerning the percentage of respondents, who could not answer more than a half of questions concerning iodine deficiency (Table 3). It was found that over 80% these individuals, both in the group of patients suffering from thyroid diseases

Table 3. The amount of answers "I do not know" from respondents who could not answer to more than 50% questions concerning iodine deficiency
Tabela 3. Ilość odpowiedzi „Nie wiem" uzyskana od respondentek, które nie potrafiły odpowiedzieć na więcej niż 50% pytań dotyczących problemu niedoboru jodu

Questions* Pytania*	Answer "I do not know" Odpowiedź „Nie wiem"			
	healthy – zdrowi (n = 200)		patients – chorzy (n = 200)	
	respondents respondenci	%	respondents respondenci	%
1. Iodine is found in drinking water 1. Jod występuje w wodzie pitnej	41	48	27	77
2. Large amounts of coffee and tea do not affect iodine absorption 2. Duże ilości pitej kawy i herbaty nie wpływają na wchłanianie jodu	53	62	26	74
3. Consumed vegetables of *Cruciferae* family do not have an effect on iodine balance of the organism 3. Spożywanie warzyw z rodziny krzyżowych nie ma wpływu na gospodarkę jodową organizmu	73	86	30	86
4. Iodine is contained in thyroid hormones 4. Jod wchodzi w skład hormonów tarczycy	28	33	12	34
5. A higher iodine content is found in saltwater than fresh-water fish 5. Większa zawartość jodu jest w rybach morskich niż słodkowodnych	53	62	21	60
6. In Poland table salt is most frequently fortified with iodine 6. W Polsce najczęściej wzbogaca się w jod sól kuchenną	36	42	10	29
7. Vegetables of *Cruciferae* family accelerate iodine absorption 7. Warzywa z rodziny krzyżowych przyspieszają wchłanianie jodu	84	99	30	86
8. The type of thermal processing does not affect iodine losses during preparation of meals 8. Rodzaj obróbki cieplnej nie wpływa na straty jodu podczas przygotowywania posiłków	69	81	29	83
9. In Poland margarines are fortified with iodine 9. W Polsce wzbogaca się w jod margaryny	69	81	25	71
10. The highest contents of iodine are found in fresh-water fish 10. Najwięcej jodu zawierają ryby słodkowodne	65	76	22	63
11. Consumption of soy and peanuts lowers iodine absorption in the organism 11. Spożywanie soi i orzeszków ziemnych obniża wchłanianie jodu w organizmie	81	95	33	94
Total – Wszystkie	85	100	35	100

*The questions, which over 80% respondents were not able to answer, were shadowed.
*Zacieniono pytania, na które nie potrafiło odpowiedzieć ponad 80% respondentów.

and in the group of healthy individuals, could not answer four out of five questions on this subject. The above analysis confirmed also that being aware of the thyroid disease motivated patients to broaden their knowledge on iodine deficiency, which is closely connected with these diseases. As a consequence in the group of patients only 35 individuals out of 200 were not able to give their pinion on over 50% statements. In turn, in the group of healthy individuals there were as many as 85 such respondents, out of which 23 individuals gave the answer of "I don't know" to over 90% questions.

DISCUSSION

Results indicate that the women participating in the study have relatively well-grounded knowledge in terms of basic issues concerning iodine deficiency, such as the role of iodine for the human organism and the application of iodized table salt as the primary method of food enrichment with iodine. This is the result of educational activities conducted within the framework of the National Program for the Elimination of Iodine Deficiency in Poland. Educational activities in terms of the dissemination of knowledge on the problem of iodine deficiency have not resulted in a situation when information on sources of iodine in the diet or factors limiting its supply could be thoroughly retained in the memory of respondents.

Investigations also showed that the awareness of the thyroid disease is a motivation to collect information, contributing significantly to an improvement of the level of knowledge on iodine deficiency. Patients could take this knowledge as a result of contacts with their doctor or from patient leaflets distributed in clinics, as well as searching for it on their own (books, the Internet, acquaintances as sources of information). However, it was shown that in case of some issues these sources did not supply adequate information. Many patients do not know that products such as cruciferous plants (e.g. cabbage, cauliflower and Brussels sprouts), legumes (soy, peanuts) and beverages (e.g. coffee, cola) contain compounds, which may limit the utilization of iodine in the synthesis of thyroid hormones [Bączyk et al. 2006]. Thus they need to cut down on their consumption in case of diagnosed diseases of this gland. This pertains to knowledge on the effect of technological processes (e.g. thermal processing) on iodine content in food – information required for the planning of a diet and appropriate selection of cooking method ensuring an adequate supply of this element.

CONCLUSIONS

Since neither patients with thyroid disorders nor healthy individuals have the knowledge concerning factors affecting iodine supply from their diet, it seems justified to focus our attention on these issues within the framework of educational activities at Clinics of Thyroid Diseases and within the National Program for the Elimination of Iodine Deficiency (with special emphasis on pregnant women, children and teenagers, i.e. populations at the highest risk caused by the effects of iodine deficiency). This knowledge may be supplied in the form of leaflets prepared by scientific institutions, in which this type of information could be comprehensively presented. Moreover, in this

task it is necessary involve nutritionists, who should be employed in clinics to provide adequate counselling on the selection of an appropriate diet. Such a procedure should be consistent with the activity of the Polish government within the common policy of the European Union, concerning the promotion of healthy nutrition and physical activity [COM 637... 2005], and consistent with the global strategy of WHO [The World... 2002, Resolution... 2004].

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POZIOM EDUKACJI ŻYWIENIOWEJ U OSÓB ZE ZDIAGNOZOWANYMI CHOROBAMI TARCZYCY

Streszczenie. Celem pracy było określenie stanu wiedzy żywieniowej dotyczącej problemu niedoboru jodu wśród kobiet ze zdiagnozowanymi chorobami tarczycy oraz porównanie jej z wiedzą kobiet zdrowych. Badania prowadzono metodą wywiadu bezpośredniego wśród 400 kobiet, w tym 200 pacjentek Poradni Chorób Tarczycy w Poznaniu i 200 osób zdrowych (u których nie zdiagnozowano chorób tarczycy). Respondentów poproszono o ustosunkowanie się do zestawu twierdzeń związanych z profilaktyką niedoboru jodu. Badania wykazały odpowiedni poziom wiedzy na temat podstawowych zagadnień dotyczących niedobory jodu, czyli roli jodu w funkcjonowaniu tarczycy i jego źródeł w diecie. Jednakże w grupie kobiet zarówno chorych, jak i zdrowych stwierdzono mały zasób wiedzy o wpływie obróbki termicznej na zawartość jodu w żywności oraz czynnikach ograniczających jego podaż. Poziom wiedzy żywieniowej kobiet cierpiących na choroby tarczycy był wyższy niż kobiet zdrowych. Ponieważ wiedza o czynnikach ograniczających podaż jodu z diety ma istotne znaczenie dla efektywności działań podejmowanych w profilaktyce niedoboru jodu, wydaje się ważne uwzględnienie tych zagadnień w prowadzeniu edukacji żywieniowej.

Słowa kluczowe: choroby tarczycy, kobiety, wiedza żywieniowa, źródła jodu, czynniki ograniczające podaż jodu

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