

Obuchowska Aleksandra, Wójcik Justyna, Standyło Arkadiusz, Obuchowska Karolina, Ozga Alicja, Kimber-Trojnar Żaneta, Leszczyńska-Gorzelał Bożena. Assessment of students' knowledge on iodine supplementation by women planning pregnancy. *Journal of Education, Health and Sport*. 2020;10(9):270-277. eISSN 2391-8306. DOI <http://dx.doi.org/10.12775/JEHS.2020.10.09.030> <https://apcz.umk.pl/czasopisma/index.php/JEHS/article/view/JEHS.2020.10.09.030> <https://zenodo.org/record/4024544>

The journal has had 5 points in Ministry of Science and Higher Education parametric evaluation. § 8. 2) and § 12. 1. 2) 22.02.2019.

© The Authors 2020:

This article is published with open access at Licensee Open Journal Systems of Nicolaus Copernicus University in Torun, Poland

Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike. (<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 20.08.2020. Revised: 25.08.2020. Accepted: 11.09.2020.

## Assessment of students' knowledge on iodine supplementation by women planning pregnancy

Aleksandra Obuchowska<sup>1a</sup>, Justyna Wójcik<sup>1b</sup>, Arkadiusz Standyło<sup>1c</sup>,  
Karolina Obuchowska<sup>1d</sup>, Alicja Ozga<sup>1e</sup>, Żaneta Kimber-Trojnar<sup>2f</sup>,  
Bożena Leszczyńska-Gorzelał<sup>2g</sup>

<sup>a</sup> aobuchowska12@gmail.com; <https://orcid.org/0000-0003-0464-2695>

<sup>b</sup> justynawojcik455@gmail.com; <https://orcid.org/0000-0001-7163-6784>

<sup>c</sup> a.standylo@gmail.com; <https://orcid.org/0000-0002-5154-4759>

<sup>d</sup> karolinaobuchowska99@gmail.com; <https://orcid.org/0000-0003-4519-8236>

<sup>e</sup> aozga1@gmail.com; <https://orcid.org/0000-0003-1291-905X>

<sup>f</sup> zkimber@poczta.onet.pl; <https://orcid.org/0000-0001-7295-0409>

<sup>g</sup> b.leszczyńska@umlub.pl; <https://orcid.org/0000-0002-0221-1982>

<sup>1</sup> Student's Scientific Association at the Chair and Department of Perinatology and Obstetrics, Medical University of Lublin, Poland

<sup>2</sup> Chair and Department of Perinatology and Obstetrics, Medical University of Lublin, Poland

### Corresponding author:

Aleksandra Obuchowska

Student's Scientific Association at the Department of Perinatology and Obstetrics

Jaczewskiego 8 Street

20-954 Lublin, Poland

e-mail: [aobuchowska12@gmail.com](mailto:aobuchowska12@gmail.com)

## **Abstract:**

**Introduction:** Iodine is essential for the synthesis of the thyroid hormones. Proper thyroid function in a pregnant woman depends on the accumulated reserves of iodine in the pre-pregnancy period. If they are sufficient, the production of thyroid hormones is adequate even in the case of increased demand. Adequate iodine status during pregnancy is crucial for maternal health and foetal growth. Severe iodine deficiency causes maternal and foetal hypothyroxinaemia, leading to irreversible brain damage, manifested by mental retardation and neurological disorders. The daily requirement for iodine for pregnant women has been determined by The World Health Organization (WHO) at 250 µg. Most likely, the demand for it cannot be covered only by dietary iodine intake, so iodine should be supplemented in the form of tablets at a dose of 150-200 µg daily.

**Purpose:** The aim of the study is to assess students' knowledge on iodine supplementation by women planning pregnancy and pregnant women.

**Material and method:** Students' knowledge regarding the importance of iodine supplementation was verified using anonymous Internet questionnaire. The obtained results were analysed and checked on the basis of scientific literature.

**Results:** The percentage of students who think iodine supplementation should be recommended is 22.7%, and 9.7% believe it is not necessary. Only 8.8% of the respondents chose the correct recommended dose of iodine. Surprisingly, most of the respondents do not know the recommended iodine dose, as much as 71.7% of them.

**Conclusions:** The proper supply of iodine has a decisive impact on the proper functioning of the body, and its deficiency has serious consequences, especially in the womb. The problem of iodine deficiency is serious. This is also confirmed by the results of our surveys. It is important to educate students on the recommendations for iodine supplementation in women of childbearing age.

**Key words:** Iodine, Iodine deficiency disorder, pregnancy, supplementation among students, dietary supplements, foetal development

## **Introduction:**

Iodine is an essential component of the hormones produced by the thyroid gland [1]. Thyroid hormones are essential for the neurological development of the foetus and in the early postnatal life [2]. During pregnancy, the need for iodine increases significantly, among others due to the increased production of thyroid hormones (thyroxine production increases by about 50%), the passage of iodine through the barrier blood - placenta, an increase in the renal clearance [3]. The initial phase of the development of the foetal nerve centres depends on the production of thyroxine in the mother's body. Proper thyroid function in a pregnant woman depends on the accumulated reserves of iodine in the pre-pregnancy period. If they are sufficient, the production of thyroid hormones is adequate even in the case of increased demand. Adequate iodine status in pregnancy is crucial for maternal health and foetal growth [4].

Pregnant women living in areas with borderline to moderate to severe iodine deficiency are at particular risk of iodine deficiency [1]. It is estimated that 2/3 of Western and Central European countries are prone to iodine deficiency [5,6].

The iodine deficiency has serious consequences across all age groups: goitre including toxic nodular goitre; increased occurrence of hypothyroidism in moderate-to-severe iodine deficiency; reduced occurrence of hypothyroidism in mild-to-moderate iodine deficiency; enhanced susceptibility of the thyroid gland to nuclear radiation. The most serious side effects of iodine deficiency on the foetus are abortion, stillbirth, congenital anomalies, perinatal mortality. Severe iodine deficiency in the foetus causes cretinism, which is characterized by severe mental retardation, short stature, deafness and spasticity [7].

Iodine supplementation before and during pregnancy has been shown to reduce or eliminate the risk of severe mental retardation and neurological disorders in children [8]. The daily requirement for iodine in pregnant women has been determined by The World Health Organization (WHO) at 250 µg. Most likely, the demand for it cannot be covered only by dietary iodine intake, so iodine should be supplemented in the form of tablets at a dose of 150 µg daily from the very beginning of pregnancy [5,9,10]. Ideally, iodine should be supplemented before pregnancy. This enables the accumulation of adequate reserves (about 20-30 mg) necessary for increased thyroxine production from the first weeks of pregnancy [11]. Normal amounts of thyroid hormones are needed for neuronal migration and myelination of the foetal brain, and insufficient iodine levels irreversibly impair brain development [12].

**Purpose:** The aim of the study was to analyse opinions of 1022 students on iodine supplementation by women planning pregnancy and pregnant women.

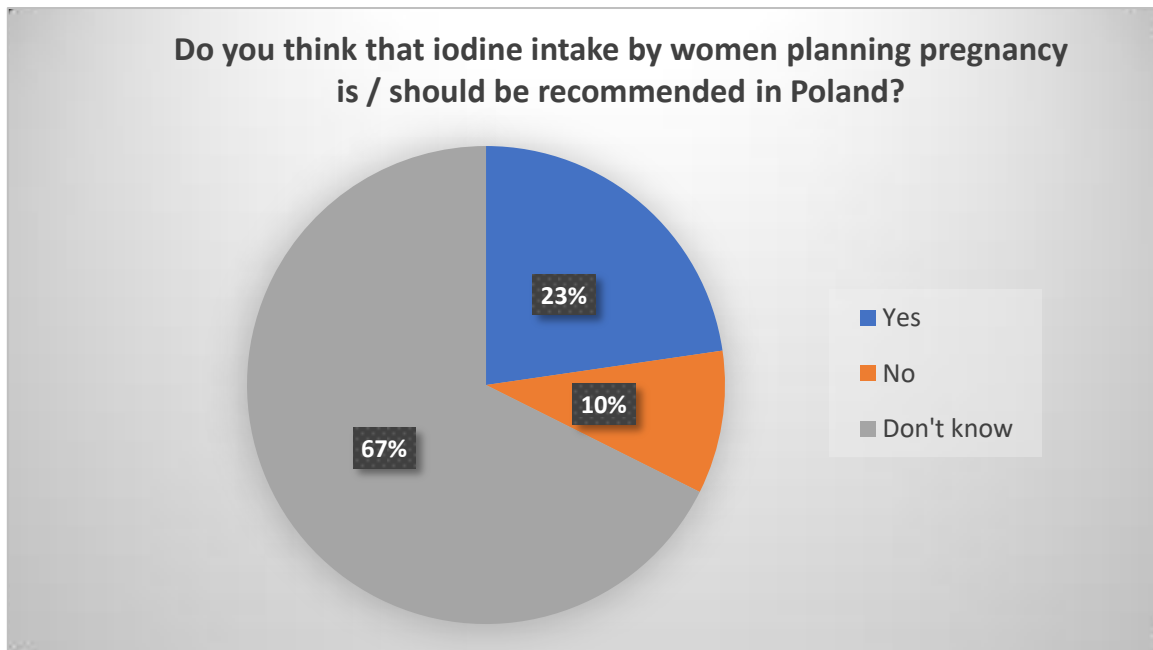
**Material and methods:** The research was conducted on the group of 1022 survey respondents, who filled out the Internet questionnaire. The study was conducted from 3<sup>rd</sup> November 2018 to 10<sup>th</sup> July 2019. Participation in the experiment was voluntary. The results were analysed and checked on the basis of scientific literature. The results were statistically processed using for this program Microsoft Office Excel.

**Results:** 848 women and 174 men aged 18-27 years filled out the Internet questionnaire. The majority of participants study at universities located in Lublin (66,6% of them). 47% of the respondents live in a city with more than 100,000 inhabitants, 24.9% in a smaller city, while in rural areas 28.1% of them [Table 1].

<b>Sex</b>	Women	848	82.9%
	Men	175	17.1%
<b>Age (years)</b>	18	2	0.2%
	19	32	3.13%
	20	87	8.51%
	21	191	18.69%
	22	267	26.13%
	23	204	19.96%
	24	120	11.74%
	25	66	6.46%
	26	27	2.64%
	27	18	1.76%
28	7	0.68%	
<b>Place of residence</b>	The city over 100.000 residents	481	47 %
	The city 20-100.000 residents	171	16.7%
	The city below 20,000 residents	84	8.2%
	Village	287	28.1%
<b>Sexual active</b>	Yes	710	69.4%
	No	312	30.6%
<b>Planning children</b>	Yes, up to a year	16	1.6%
	Yes, up to 3 years	128	12.5%
	Yes, up to 5 years	304	29.7%
	Yes, in over 5 years	285	27.9%
	No	137	13.4%
	Don't know	153	15%

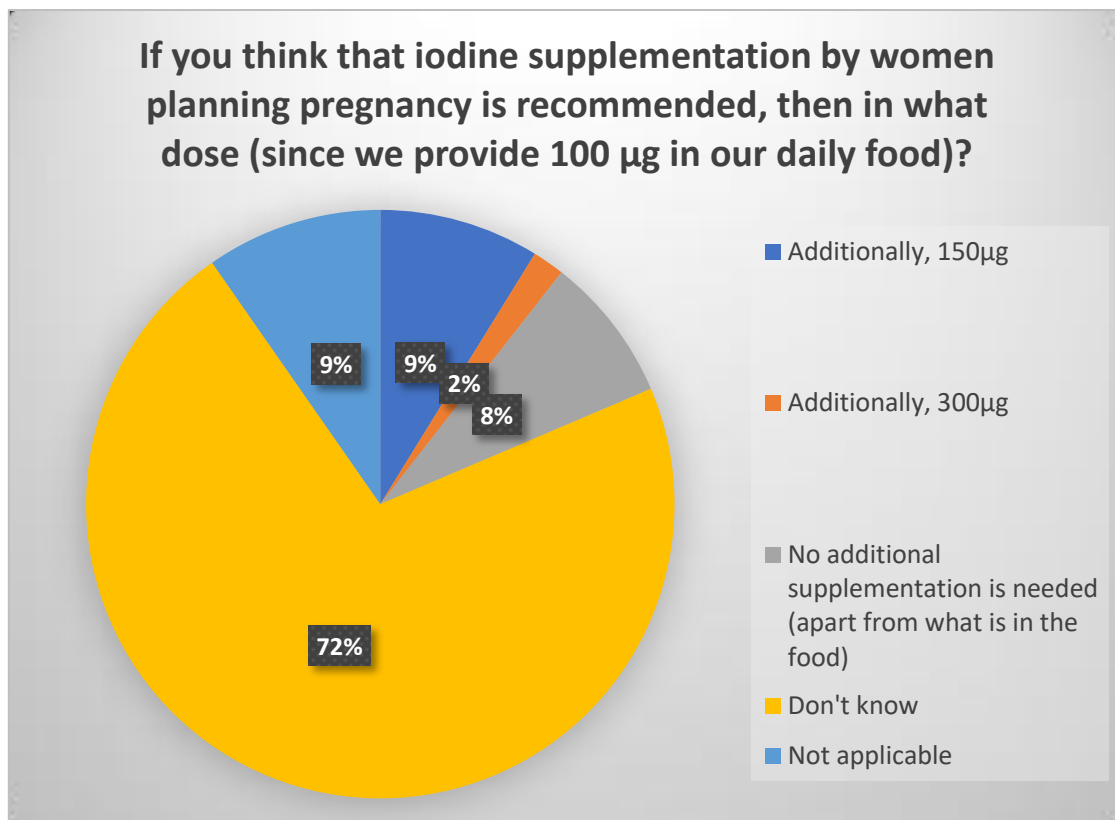
**Table 1. Characteristics of the study group**

Students were asked whether the intake of iodine by women planning pregnancy is or should be recommended in Poland [Figure 1]. The percentage of students who think that supplementation should be recommended is 22.7% (n=232), while 9.7% (n=99) of them believe that it is not necessary. Interestingly, most of the survey respondents – 67,6% (n=691) do not know the answer to the question asked about iodine supplementation by women planning pregnancy.



**Figure 1. Intake of iodine by women planning pregnancy.**

The students were also asked what dose daily women planning pregnancy should supplement [Figure 2]. Only 10.6% of students believe that iodine supplementation is essential for women planning a pregnancy. 8.8% (n=90) of the survey respondents chose the correct recommended iodine dose – 150 µg. 1.8% (n=18) of students consider supplementation necessary, but at a dose of 300 µg. 8% (n=82) of students believe that women planning pregnancy do not need to take additional iodine and that the amount provided with food is sufficient. Surprisingly, most of the respondents do not know the recommended iodine dose, there are as many as 71.7% of them (n=733).



**Figure 2. The iodine dose recommended for women planning pregnancy.**

### **Discussion:**

The number of students who took part in the study was 1022. The majority of them - almost 82.9% (n=848) were women. Respondents were young and in procreative age - 18-28 years old. 69.4% (n=710) of them are sexually active and 43.8% (n=448) are planning a child within 5 years. More than 2/3 of them studied in medical universities.

The aim of our research was to test students' knowledge of the need for iodine supplementation, especially in women planning pregnancy.

In 1997, compulsory iodine prophylaxis was introduced in Poland. The Polish model of iodine prophylaxis contains obligatory iodisation of household salt (20–40 mg KI/1 kg) and neonates' formula (10 µg/100 mL of milk), and additional supplementation for pregnant and breastfeeding women with 150–200 µg of iodine as pharmacotherapy (in the form of potassium iodide (KI) or multivitamin supplements containing KI) [13]. Despite this the daily consumption of this micronutrient is insufficient. The effectiveness of prophylaxis can be monitored in random urine samples. The iodine value in urine samples for pregnant women should be in the range 150-200 µg/l [14].

Studies carried out in 2007-2009 in Poland showed that despite the introduced iodine prophylaxis, 79% of pregnant women were deficient in iodine [14]. Unfortunately, no more than 57-70% of pregnant women receive the recommended dose of iodine [13,14]. A study also carried out in Poland showed that only 20% of the tested pregnant women had normal ioduria [15]. The median ioduria was significantly higher in women supplementing iodine [15].

Unfortunately, our study showed that only 22.7% of students believe that iodine supplementation by women planning pregnancy is recommended. Worse, only 8.8% of them know the correct dose. More than two-thirds of students do not know whether to supplement iodine or in what dose. This information is alarming as iodine deficiency has been frequently found in female students in clinical trials.

Similar research on the knowledge of iodine supplementation was also conducted among young nonpregnant women aged 18-30 (mostly female students) from Norway [16]. The study found that young women in Norway have inadequate iodine intake and mild to moderate iodine deficiency. It has also been shown that vegetarians have lower levels of iodine. Research on the knowledge of iodine supplementation and its value in the diet showed a low or medium level of knowledge among respondents [16].

An interesting study was conducted to determine iodine concentration in urine among the students of the Faculty of Pharmacy Medical University of Silesia in Katowice [17]. The ioduria value below 100 µg/l proves about iodine deficiency. 49.5% of female students had normal urine iodine concentration, while the rest showed an insufficient supply of this element in the diet [17]. 16.8% of female students had a moderate deficiency and 25.8% of them had a mild deficiency [17]. As many as 7.9% of female students had a severe urinary iodine deficiency, which could have a serious effect on the foetal development if pregnancy occurs [17].

Bath et al. assessed the amount of iodine consumed by British pregnant women [18]. In this group, it has been observed that very few women take iodine supplementation (only 3%). Unfortunately, the studied group of British women was characterized by mild to moderate iodine deficiency [18].

It is worth remembering that proper iodine intake is particularly important for the foetus prosperity. The Fall's et al. study showed that administering an iodine supplement to pregnant women resulted in a lower number of miscarriages and stillbirths and increased the birth weight of new-borns [19].

**Conclusions:** The correct supply of iodine has a decisive influence on the proper functioning of the body. Insufficient supply of this element in the diet may contribute to the development of disorders of the thyroid gland and have serious health consequences, as thyroid hormones regulate many important functions of the organism. The problem of iodine deficiency continues to exist in society and may be the result of an inadequate diet. Although the problem of iodine deficiency among students is serious, too little time is spent educating about its role in the body. This is also evidenced by the results of our surveys. It is important to educate students about the recommendations for iodine supplementation in women of reproductive age.

## References:

1. Taylor PN, Vaidya B. Iodine supplementation in pregnancy - is it time? *Clin Endocrinol (Oxf)*. 2016;85(1):10-14. doi:10.1111/cen.13065.
2. Rovet JF. The role of thyroid hormones for brain development and cognitive function. *Endocr Development*. 2014; 26– 43.
3. Glineor D. The regulation of thyroid function during normal pregnancy: importance of the iodine nutrition status. *Best Pract. Res. Clin. Endocrinol. Metab*. 2004; 18: 133–152.
4. Smyth PP. Dietary iodine intake in pregnancy. *Irish Med. J*. 2006; 99: 103.
5. Zimmermann M, Delange F. Iodine supplementation of pregnant women in Europe: a review and recommendations. *Eur. J. Clin. Nutr*. 2004; 58: 979– 984.
6. Anderson M et al. Iodine deficiency in Europe: a continuing public health problem. WHO, Geneva 2007.
7. Zimmermann MB, Jooste PL, Pandav CS. Iodine-deficiency disorders. *Lancet*. 2008;372(9645):1251-1262. doi:10.1016/S0140-6736(08)61005-3.
8. Zimmermann MB. Iodine deficiency in pregnancy and the effects of maternal supplementation on the offspring. *Am. J. Clin. Nutr*. 2009; 89 (suppl): 668S–672S.
9. Karowicz-Bilińska A, Nowak-Markwitz E, Opala T, Oszukowski P, Poręba R, Spaczyński M. Rekomendacje Polskiego Towarzystwa Ginekologicznego w zakresie stosowania witamin i mikroelementów u kobiet planujących ciążę, ciężarnych i karmiących. [Recommendations of the Polish Gynecological Society on the use of vitamins and microelements in women planning pregnancy, pregnant and lactating women]. *Ginekol Pol*. 2014(5), 85, 395-399.
10. Public Health Committee of the American Thyroid Association, Becker DV, Braverman LE, et al. Iodine supplementation for pregnancy and lactation-United States and Canada: recommendations of the American Thyroid Association. *Thyroid*. 2006;16(10):949-951. doi:10.1089/thy.2006.16.949Pearce E.N.
11. Pearce EN. What Do We Know about Iodine Supplementation in Pregnancy? *The Journal of Clinical Endocrinology & Metabolism*. 2009; 3188–3190, <https://doi.org/10.1210/jc.2009-1512>.
12. Bernal J. *Thyroid Hormones in Brain Development and Function*. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK285549/>
13. Szybiński Z. Work of the Polish Council for Control of Iodine Deficiency Disorders, and the model of iodine prophylaxis in Poland. *Polish Journal of Endocrinology*. 2012(2):63; 156-160.
14. Hubalewska-Dydejczyk A, Lewiński A, Milewicz A, Radowicki S, Poręba R, et al. Postępowanie w chorobach tarczycy u kobiet w ciąży [Management of thyroid diseases during pregnancy]. *Polish Journal of Endocrinology*. 2011(4); 62: 362-381.
15. Gietka-Czernel M, Dębska M, Kretowicz P et al. Iodine status of pregnant women from central Poland 10 years after introduction of iodine prophylaxis program. *Endokrynol Pol — Polish J Endocrinol*. 2010; 61: 646–651.
16. Henjum S, Brantsæter AL, Kurniasari A, Dahl L, Aadland EK, et al. Suboptimal Iodine Status and Low Iodine Knowledge in Young Norwegian Women. *Nutrients*. 2018;10(7):941.
17. Kucharczyk M, Stanjek-Cichoracka A, Kochańska-Dziurowicz A, Bijak A. Ocena jodurii u studentek wydziału farmaceutycznego. [The assessment of ioduria among students of the Faculty of Pharmacy]. *Medycyna Środowiskowa - Environmental Medicine*. 2012; 15(3):66-71.
18. Bath SC, Furnidge-Owen VL, Redman CWG, et al. Gestational changes in iodine status in a cohort study of pregnant women from the United Kingdom: season as an effect modifier. *Am J Clin Nutr*. 2015; 101(6): 1180– 1187, doi: 10.3945/ajcn.114.105536, indexed in Pubmed: 25948667.
19. Fall C, Yajnik C, Rao S, et al. Micronutrients and Fetal Growth. *J Nutr*. 2003; 133(5 Suppl 2): 1747S–1756S, doi: 10.1093/ jn/133.5.1747s, indexed in Pubmed: 12730494.