

# Journal of Nutrition and Food Science Forecast

## Nutrition-the Main Factor in Primary Prevention of Thyroid Diseases and Type 2 Diabetes

Szybiński Z\*

Department of Endocrinology, Collegium Medicum in Krakow, Jagiellonian University, Poland

### Abstract

According to the International Council for Control of Iodine Deficiency Disorders (ICCIDD) Poland has been classified as an iodine deficient area. Following recommendation of the Polish Council for Control of Iodine Deficiency Disorders in 1996/1997 mandatory iodization of household salt with 30 +/- 10 mg KI/kg was introduced. The results showed that prevalence of goiter in schoolchildren decreased from 14.5% to 5.2%. Such progress led the WHO to reclassified Poland as a country with sufficient iodine consumption on the population level.

The type 2 diabetes belongs to the group of non communicable diseases. It represents over 90% of all kind of diabetes and in Poland its frequency (in the period 1998-2000) reached a value on the population level 5.38%. Introducing the preventive program in the selected groups of patients based on reducing obesity and increase physical activity showed that intervention in style of life may be effective and may diminish group of patients with impaired glucose tolerance. However on the population level prevalence of obesity and type 2 diabetes is still growing up. It is true challenge for health service and decision markers. In Europe the DE-PLAN project led by University of Helsinki was developed.

### Introduction

Thyroid diseases and type 2 diabetes according to WHO have been included into the preventive non communicable diseases [1]. In Poland prevalence of goiter in children aged 6-12 years achieved endemic level -24.5% [2] and in pregnant women 80% [3] Prevalence of type 2 diabetes achieved also endemic level -5.37% of Polish population and 50% represented so called "unknown" diabetes diagnosed in the course of investigation [4].

Non communicable diseases are a global challenge in Europe and over world due to increasing prevalence of main risk factor of type 2 diabetes, obesity, iodine deficiency and other nutrition dependent disease [4]. In the face of increasingly rate of these type diseases World Health Organization organized "European Ministerial Conference" on counteracting obesity in 2006 in Istanbul [5]. In 2007 the European Commission issued a "White Paper on a Strategy for Europe on Nutrition", and in this same year the WHO Regional Committee for Europe endorsed "The WHO European Action Plan for Food and Nutrition Policy 2007-2012" [6] as a framework for preventive action and monitoring, to be undertaken by Member States. In 2020 WHO organized Ministerial Conference on Nutrition and Non communicable Diseases [7].

A very important action of WHO was organization "WHO Collaborating Centers for Nutrition" as a collaborating network at global levels. In 2008 "WHO Collaborating Center for Nutrition" was designated at the Department of Endocrinology, Collegium Medicum, Jagiellonian University in Krakow, Poland [8].

### Thyroid Diseases

The most frequent disease of thyroid gland is its enlargement-goiter, and main risk factor of goiter is iodine deficiency. The iodine takes part in the process of thyroid hormones synthesis: thyroxin and 3-jodothyroxine, the main hormones regulating all metabolic pathways. When daily iodine requirement (Table 1) is not covered by every day diet. This situation leads to development of goiter and in the pregnant and Breast feeding women may lead to undevelopment the brain in child and cretinism [9].

In the seaside areas every day diet covers daily iodine requirements, however pregnant and breast feeding women should receive additional 100-150 ug of iodine. It must be taken under

### OPEN ACCESS

#### \*Correspondence:

Zbigniew Szybiński, Department of Endocrinology, Collegium Medicum in Krakow, Jagiellonian University, Poland.

E-mail: szybin@cm-uj.krakow.pl

Received Date: 16 Sep 2019

Accepted Date: 03 May 2020

Published Date: 11 May 2020

Citation: Szybiński Z. Nutrition-the Main Factor in Primary Prevention of Thyroid Diseases and Type 2 Diabetes. *J Nutri Food Sci Forecast.* 2020; 3(1): 1014.

ISSN 2643-8186

Copyright © 2020 Szybiński Z. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

consideration in every model of iodine prophylaxis.

The most popular carrier of iodine in Europe and the United State of America is salt and very important information is consumption of iodized salt (Natrium Chloride). When sodium is the main risk factor for hypertension and arteriosclerosis, daily salt intake should be limited according to WHO recommendation to 5.0 g/day for the both type of salt: industry and household salt [10].

## Iodine Prophylaxis in Poland Over the World

Following recommendation of the Polish Council for Control of Iodine Deficiency Disorders and Polish Society of Endocrinology [11]. Minister of Health set up in 1996 mandatory iodization of household salt with 20-40mg KI/1kg.

The model of iodine prophylaxis in Poland takes under consideration limitation in daily intake of Natrium Chloride as again carrier of iodine (Table 2).

Before implementation of the model of iodine prophylaxis frequency of goiter in schoolchildren aged 6-12 years was 24.5% [12] and in women -80% [3]. Around 10 years after implementation, prevalence of goiter in schoolchildren fell to 4.7 % below endemic level, and in pregnant women to 19% [13].

The model of iodine prophylaxis in Poland turned out that is very effective on the population level and as a strong antioxidant caused additional benefit decrease in the frequency of medullar thyroid cancer follicular thyroid cancer [14] and gastric cancer [15]. In the light of such progress a conference of WHO experts as well as the International Commission for Preventing Iodine Deficiency reclassified Poland as a country with sufficient iodine consumption at a national level [16].

According to WHO recommendation salt (Natrium Chloride) is the main carrier of iodine in the systems of iodine prophylaxis over the world [17]. This model became very effective and actually 86% of the global population uses iodized salt as the main carrier of iodine in their systems of iodine prophylaxis. Since the early 1990s a progress in the elimination of iodine deficiency has been observed. It must be stressed, that every model of iodine prophylaxis must be monitored, especially in the case of iodine status of pregnant women, infants and younger children particularly vulnerable to the health consequences of iodine deficiency disorders [18].

When Natrium Chloride is the main carrier of iodine, daily consumption of iodine must be balanced with consumption of Natrium as a risk factor for hypertension, atherosclerosis, myocardial infarction, stroke and some cancers. According to WHO recommendation daily table salt (NaCl) consumption should be reduced to 5.0g/day [19,20]. Therefore in the Polish Model of Iodine Prophylaxis increased consumption of other iodine carriers: see fish, eggs, milk, fruits and vegetable is also recommended [21].

## Type 2 Diabetes

The type 2 diabetes represents a very important disease within the group of non communicable diseases. It represents over 90% of all kind of diabetes and in Poland its frequency (in the period 1998-2000) reached a value on the population level 5.38%. It is true endemic state and it must be stressed its frequency is still growing up. The type 2 diabetes makes 90% of the all cases of diabetes and in Poland an actual number of diabetic patients is over 2 million and 50% of them represent "unknown diabetes" diagnosed in the course

**Table 1:** Daily Iodine Requirements.

	Daily Iodine Requirements (ug/day)
Nursery children (0-55 months)	90
School children (6-12 years)	120
Adults (>12 years)	150
Pregnant and breast feeding women	250

**Table 2:** The model of iodine prophylaxis in Poland.

1	Obligatory iodization of table salt	(30 +/-10 mg KI /1 kg)
2	Obligatory iodization of neonatal formula	(10 mg KJ/100ml)v
3	Recommended additional daily dose of iodine for pregnant and breast feeding women	100-150 ug
4	Recommended increased consumption of iodine carriers	see fish, eggs, milk, fruits and vegetable

**Table 3:** Risk factors of type 2 diabetes related to lifestyle.

Primary Factors	Secondary Factors
Obesity	Tobacco smoking
Low physical activity	Alcohol abuse

of investigation [22].

This disease is preventable; however preventive action must be undertaken in early phase of the disease development and should be based on the sensitive diagnostic tests. According to WHO recommendation the most sensitive diagnostic test is 2 hours oral glucose tolerance test [23,24].

Diabetes Mellitus-especially type 2 is a growing health problem over the world [25]. The representatives of all European countries including Poland signed the Saint Vincent Declaration that indicates the main goals to prevent and treat this disease [26].

The main risk factor for type 2 diabetes development is obesity that brings about hyperinsulinemia and insulin resistance [27]. It leads to dyslipidemia and hypertension [28]. These risk factors create a picture of pathogenesis and have been defined as "metabolic syndrome" [28-30].

The results of the Polish Multicenter Study on Diabetes Epidemiology [22] permitted to divide risk factors of type 2 diabetes related to lifestyle on two groups: primary and secondary (Table 3). This kind of division is very important for primary prevention program. This complex of the risk factors creates the ground for primary prevention of the type 2 diabetes. However the main area for prevention is risk factors related to lifestyle they may be modified or removed. The first task is at least decreased of obesity it is possible my normalization of every day diet be means of diminishing of the amounts of the main carriers of calories and saturated fats and sugar and increase consumption of

Fruits, vegetable and fiber. Obesity may be expressed by Body Mass Index (BMI) [31]. In the primary preventive programs a leading role plays increase of physical activity increasing activity of insulin and glucose metabolism.

This model of prevention of primary prevention of the type 2 diabetes has been confirmed by the International Diabetes Federation [32]. This model is very effective it was confirmed in investigation undertaken in Poland and Europe. In Poland as early as in 1978 in the Busko SPA a group of 264 persons with different glucose intolerance including diagnosed type 2 diabetes, were treated with low caloric diet and physical activity receiving reduction of body weight and

improvement their metabolic state [33]. Poland took part in the DE-Plan project Diabetes in Europe Prevention of type 2 diabetes by lifestyle intervention in primary health care. It again confirmed effectiveness of this program 40% patients with impaired glucose tolerance reversed to normal glucose tolerance [34]. These rebuts indicate that glucose intolerance may turn back to normal glucose test under condition that preventive program is undertaken in early phase of development of the disease.

In the lights of a global incidence of obesity and diabetes it is great 21<sup>st</sup> century challenge for health service and decision makers.

## References

1. WHO Global Status Report on Noncommunicable Diseases 2010.
2. Szybiński Z, Żarnecki A. Prevalence of goiter, iodine deficiency and iodine prophylaxis in Poland. The results of a nation-wide study. *Endokrynol Pol.* 1993; 44: 373-388.
3. Krzyczkowska-Sendrakowska M, Zdebski Z, Kaim I, Gołkowski F, Szybiński Z. Iodine deficiency in pregnant women in an area of moderate goitre endemia. *Endokrynol Pol.* 1993; 44: 344-350.
4. Szybiński Z. [Polish Multicenter Study on Diabetes Epidemiology (PMSDE)--1998-2000]. *Pol Arch Med Wewn.* 2001; 106: 751-758.
5. WHO European Ministerial Conference on Counteracting Obesity Conference Report. 2006.
6. WHO European Action Plan for Food and Nutrition Policy 2007-2012.
7. Vienna Declaration on Nutrition and Noncommunicable Diseases in the Context of Health 2020.
8. Szybiński Z, Breda J. Summary from the Europea Meeting of WHO Collaborating Centres for Nutrition, Kraków, 23-24 June 2010. *Endokrynol Pol.* 2011; 62: 204-206.
9. Diet nutrition and prevention of chronic diseases. Report of a Joint WHO/FAO Expert Consultation. Geneva. 2003.
10. WHO Guidline-Sodium intake for adults and children. Geneva. 2012.
11. Recommendation of the Polish Council for Control of Iodine Deficiency Disorders and Polish Society of Endocrinology. *Pol J of Endocrinology.* 1998.
12. Szybiński Z, Jedrychowski W, Konieczna W, Barylak H, Bednarczyk D, Bobrowski A, et al. Incidence of goiter is school children from the Province of Cracow in relation to their place of residence, sex and age. *Pol Tyg Lek.* 1974; 29: 2157-2167.
13. Szybiński Z, Zdebski Z, Lewiński A, et al. Influence of iodine supplementation on the incidence of goiter and ioduria in pregnant women with iodine deficiency-a multicenter study. *Pol J of Endocrinol.* 1998; 49: 151.
14. Huszno B, Szybiński Z, Przybylik-Mazurek E, Stachura J, Trofimiuk M, Buziak-Bereza M, et al. Influence of iodine deficiency and iodine prophylaxis on thyroid cancer histotypes and incidence in endemic goiter area. *J Endocrinol Invest.* 2003; 26: 71-76.
15. Gołkowski F, Szybiński Z, Rachtan J, Sokołowski A, Buziak-Bereza M, Trofimiuk M, et al. Iodine prophylaxis--the protective factor against stomach cancer. *Eur J Nutr.* 2007; 46: 251-256.
16. WHO Iodine deficiency in Europe: a continuing public health problem. WHO 2003.
17. WHO, UNICEF, ICCIDD. Recommended iodine levels in salt and guidelines for monitoring their adequacy and effectiveness. 1996.
18. UNICEFF, Globally 86% of the population has access to iodized salt.
19. WHO Forum and Technical Meeting on Reducing WHO Salt Intake in the Population. 2006.
20. WHO Report of a WHO Expert Consultation. Salt as a Vehicle for Fortification. Luxembourg. 2007.
21. Szybiński Z, Jarosz M, Hubalewska-Dydejczyk A, Stolarz-Skrzypek K, Kawecka-Jaszcz K, Traczyk I, et al. Iodine-deficiency prophylaxis and the restriction of salt consumption-a 21<sup>st</sup> century challenge. *Endokrynol Pol.* 2010; 61: 135-140.
22. Szybiński Z. Polskie Wieloośrodkowe Badania nad Epidemiologią Cukrzycy Polish Multicenter Study on Diabetes Epidemiology (PMSDE). *Pol Arch Int Med.* 2001; 106: 751-758.
23. Clasification and diagnosis of diabetes mellitus and other categories of glucose intolerance. *Diabetes.* 1979; 28: 1039-1057.
24. Diabetes Mellitus: report of a WHO Study Group. WHO technical reports series 727. 1985.
25. King H, Aubert RE, Herman WH. Global burden of diabetes, 1995-2025: prevalence, numerical estimates, and projections. *Diabetes Care.* 1998; 21: 1414-1431.
26. Diabetes care and research in Europe: the Saint Vincent declaration. *Diabet Med.* 1990; 7: 360.
27. Szybiński Z, Sieradzki J, Mruk K. Dynamics of blood insulin and sugar in obesity in population studies. *Pol Arch Int Med.* 1977; 57: 417-424.
28. Reaven GM. Role of insuline resistance in human diseases. *Diabetes.* 1988; 37:1595-1607.
29. Modan M, Halkin H, Almog S, Lusky A, Eshkol A, Shefi M, et al. Hyperinsulinemia: A link between hypertension obesity and glucose intolerance. *J Clin Invest.* 1985; 75: 809-817.
30. Grundy SM, Cleeman JI, Daniels SR, Donato KA, Eckel RH, Franklin BA, et al. Diagnosis and management of the metabolic syndrome: an American Heart Association/National Heart, Lung, and Blood Institute Scientific Statement. *Citulation.* 2005; 112: 2735-2752.
31. Nuttall FQ. Body Mass Index: Obesity, BMI, and Health: A Critical Review. *Nutr Today.* 2015; 3: 117-128.
32. Alberti KG, Zimmet P, Shaw J. International Diabetes Federation: a consensus on type 2 diabetes prevention. *Diabet Med.* 2007; 24: 451-463.
33. Szybiński Z, Sieradzki J, Mruk K, Kucharski K, Poskuta W, Korzeniowska D, et al. Early and late results of obesity treatment by way of weight-reducing diet at different stages of diabetes development. *Pol Tyg Lek.* 1978; 14: 535-538.
34. Gilis -Januszewska A, Szybiński Z, Kissimowa-Skarbek K, Piwonska-Solska B, Pach D, Topor-Madry R, et al. Prevention of type 2 diabetes by lifestyle intervention in primary health care setting in Poland: Diabetes in Europe Prevention using Lifestyle, physical Activity and Nutritional intervention (DE-PLAN) project. *The British J of Diabetes and Vascular Diseases.* 2011; 11: 198-203.