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CHARACTERISTICS OF FOOD LABELING INTENDED FOR CONSUMERS WITH TYPE 2 DIABETES

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Abstract: Supporting making right food choices in accordance with one's physician's recommendations would be a significant health-promoting factor for consumers dealing with the modern-age disease of type 2 diabetes. Undoubtedly, appropriate food labelling would be very helpful. Including only the amount and calorific value of food on its packaging is not enough to enable consumers with type 2 diabetes to properly control their glycemia. In the authors' opinion it is necessary to consider including information on glycaemic index and glycaemic load on every food product's packaging, especially when it comes to functional foods that consumers with type 2 diabetes trust the most. . Unfortunately, both the health-promoting food labelling system – the Nutri-Score (5-Colour Nutrition Label, 5-CNL) and the Mediterranean Index – Med Index do not have regard to the glycaemic index nor the glycaemic load.
Keywords: food labelling management, type 2 diabetes, glycaemic index, glycaemic load

1. INTRODUCTION

Safety of food when it comes to its impact on human health has always been important for consumers (Dziuba and Ingaldi, 2017; Baryshnikova et al., 2020; Dziuba and Ulewicz, 2021). Knowledge on proper food labelling is essential for all food manufacturers. The rules of labelling food has been determined in many legal documents of the European Community and individual member states (Czarniecka-Skubina, and Janicki, 2009; Górska and Janczar-Smuga, 2011; Borowy and Kubiak, 2013; Flaczyk et al., 2013; Hermaniuk, 2018). This is highly significant for consumers suffering from chronic conditions and those for whom nutrition plays crucial role in maintaining high quality of life and acceptable level of health (Tomaszewska, 2010; Halagarda and Cichoń, 2011; Śmiechowska, 2012; Cyrek, 2015; Żuchowska-Grzywacz, 2019). Obviously, this category of consumers includes consumers with type 2 diabetes. Supporting making right food choices in accordance with one's physician's recommendations would be a significant health-promoting factor for consumers dealing with the modern-age disease of type 2 diabetes (Szostak and Cichocka, 2008; Głowacki et al., 2011; Oleksa et al., 2024). Surely,

adequate labelling of food products would be very helpful for them (Rosak-Szyrocka and Abbase, 2020; Radziejowska, 2023; Radziejowska and Thirakulwanich, 2023).

2. METHODOLOGY OF RESEARCH

The aim of these study was to explore information on food labelling systems with respect to the availability of information on health benefits and threats for consumers affected by type 2 diabetes. The method involved qualitative analysis of scientific literature available in the PubMed, Google Scholar databases and normative documents of the European Union and regulations of WHO. The analysis included scientific publications containing data on health labelling of food meant for patients with metabolic disorders (keywords: food labelling management, type 2 diabetes).

3. RESULTS AND DISCUSSION

Human health is influenced by many factors. However, a healthy diet, i.e. consumption of sufficient amounts of foods positively influencing human health, including fruit and vegetables, and reduction of undesirable food products, e.g. sweets or fast foods, is one of the crucial ones (Ozimek and Tomaszewska, 2011; Nesterowicz, 2015). Experts in nutrition form recommendations on proper nutrition based on scientific data that are supposed to help consumers eat healthily (Kaczorowska et al., 2018; Michalska-Pozoga and Straszak, 2017).

According to the data of the Polish National Health Fund as of the end of 2016, the number of type 2 diabetes patients amounted to 1657.7 thousand (1.14% increase in comparison to 2015). However, these data are underestimated because some individuals are not aware of the condition and remain undiagnosed. In 2015, 41.2 thousand of individuals were newly diagnosed with diabetes, and in 2016 – 42.0 thousand, thus the number of diabetes cases increased by 1.9%. Due to its commonness and increasing prevalence rate, diabetes is considered a modern-age disease. Diabetes also comprises a significant social issue, because once diagnosed diabetes has to be treated for patient's entire life. Management of chronic conditions – in this case diabetes – is a huge burden for entities paying for health services. Moreover, diabetes and its complications have negative economic results, because they place a significant burden on patient's relatives and they may result in the necessity of them resigning from jobs. In total, medical expenses related to type 2 diabetes patients covered by the Polish National Health Fund amounted to 1710.1 million PLN in 2016 (excluding medical expenses related to its complications), which means an 8.5% increase in relation to 2015. The Polish National Health Fund expenses due to the loss of the ability to work because of type 2 diabetes in 2016 amounted to 119.9 million PLN (in 2015 it was 130.0 million PLN). Incapacity benefits comprised 65.7%, i.e. 78.8 million PLN, of this amount (in 2015 – 68.7%, i.e. 89.3 million PLN), and the expenses for sick absenteeism comprised 29.9%, i.e. 35.9 million PLN (in 2015 r. – 27.6%, i.e. 35.9 million PLN) (NIK, 2018; Plocharski et al., 2018).

Results of numerous scientific research indicate that human health depends among others on the nutrition. Besides factors like: not smoking, physical activity, or reducing alcohol consumption – healthy diet is indicated by the World Health Organization (WHO) as the main factor preventing non-communicable diseases, including cardiovascular diseases, hypertension, diabetes, and cancers (WHO, 2023). Healthy diet includes both appropriate consumption of recommended nutrients, e.g. vitamins, essential fatty acids, and fibre, and restricted consumption of compounds having adverse effect on health, e.g.

saturated fats and sugar. This in turn means consuming proper amounts of commercially available food products and preparing meals from appropriately balanced ingredients. Wishing to follow a healthy diet plan it is good to follow the rules established by nutrition specialists. In Poland, the “Recommendations on Healthy Eating” was developed in a form of a plate with specific dietary recommendations arranged in 3 levels, enabling to change one’s eating habits gradually, one small step at a time. These recommendations describe which products should be consumed in higher amounts (e.g. colourful fruits and vegetables, wholegrain products), and the ones that should be consumed in smaller amounts (e.g. salt, red meat, and meat products) as well as information on which healthy products to choose instead of the ones that are less healthy (e.g. choosing water instead of sugary drinks) (Wolnicka K., 2024). Results of numerous scientific research indicate that human health depends among others on nutrition. Besides factors like: not smoking, physical activity, or reducing alcohol consumption – healthy diet is indicated by the World Health Organization (WHO) as the main factor preventing non-communicable diseases, including cardiovascular diseases, hypertension, diabetes, and cancers (WHO, 2023). Healthy diet includes both appropriate consumption of recommended nutrients, e.g. vitamins, essential fatty acids, and fibre, and restricted consumption of compounds having adverse effect on health, e.g. saturated fats and sugar. This in turn means consuming proper amounts of commercially available food products and preparing meals from appropriately balanced ingredients. Wishing to follow a healthy diet plan it is good to follow the rules established by nutrition specialists. In Poland, the “Recommendations on Healthy Eating” was developed in a form of a plate with specific dietary recommendations arranged in 3 levels, enabling to change one’s eating habits gradually, one small step at a time. These recommendations describe which products should be consumed in higher amounts (e.g. colourful fruits and vegetables, wholegrain products), and the ones that should be consumed in smaller amounts (e.g. salt, red meat, and meat products) as well as information on which healthy products to choose instead of the ones that are less healthy (e.g. choosing water instead of sugary drinks) (Wolnicka K., 2024).

In 2020, the European Commission published a report indicating that because of constantly growing numbers of overweight and obese individuals in most member states of the European Union and burden of diet-related diseases, public authorities are more and more interested in front-of-pack nutrition labelling systems (COM, 2020a).

Although now in different European countries, including Poland, several different front-of-pack nutrition labelling systems (FOPNL systems) are used voluntarily. As a part of the “farm to fork” strategy, the European Commission proposed implementation of one obligatory FOPNL system, common for the entire Union, what aims at making it easier for the consumers to follow healthy and balanced diet (COM, 2020b; COM, 2020c).

Requirements concerning mandatory information to be placed on food products’ labels were established in the article 9 of the Regulation no. 1169/2011 (EC, 2011). According to the provisions of the Regulation, it is mandatory to state the following detailed nutritional information: the name of the food, the list of ingredients, any ingredient or substances causing allergies or intolerances used in the manufacture or preparation of a food and still present in the finished product (even if in an altered form), the quantity of certain ingredients or categories of ingredients, the net quantity of the food, the date of minimum durability or the ‘use by’ date, any special storage conditions and/or conditions of use, instructions for use, the data of the entity responsible for issuing information on the food,

a nutrition declaration, with respect to beverages containing more than 1,2 % by volume of alcohol, the actual alcoholic strength by volume.

The above-mentioned data should enable the consumer to identify and properly use certain food product and to make choices appropriate for one's individual nutritional needs. According to dietary recommendations for diabetic patients information on the composition of the product including only basic nutrients is not enough (Baranik and Ostrowska, 2011). It is possible that adding information of glycaemic index / glycaemic load to food labels will make choosing appropriate foods easier for diabetic patients.

In 1981, based on the studies on the influence of 62 different products to glucose blood levels, the term of *glycaemic index* was established. The glycaemic index (GI) determines the surface area under the curve of glycaemic response measured 120 minutes after the consumption of 50 g of available carbohydrates contained in the analysed product and it is expressed in relation to the glycaemic response on the same amount of carbohydrates (50 g) from the reference product, usually glucose (GI = 100). The GI value is calculated by dividing the surface area under the glycaemic response curve of the analysed product by the corresponding surface area under the glycaemic response curve of glucose and multiplying the result by 100. Lower GI value reflects lower increase in postprandial glycemia values (Ciok and Dolna, 2006a; Ostrowska and Jeznach-Steinhagen, 2016).

In 1997, a term of the *glycaemic load* (GL) was introduced. It is a numerical value taking into consideration both the quality and quantity of carbohydrates in a product. It is calculated by multiplying the GI value of the product by the quantity of carbohydrates contained in that product expressed in grams. The results is then divided by 100. The higher the GL value of a product the higher increase in the glucose blood level can be expected after consumption of this product (Ciok and Dolna, 2006b; Adamska and Górska, 2008; Pilaciński and Wierusz-Wysocka, 2008; Hamid et al., 2020).

Scientific research has indicated that the traditional division of carbohydrates has lower impact on maintaining postprandial normoglycemia than the GI and GL values of products containing carbohydrates (Panasiuk et al., 2012; McClinhy et al., 2023; Liu et al., 2020). Numerous analyses are conducted on the influence of low GI diet plans on the course of metabolic reactions of the organism. Literature includes both enthusiastic and sceptical opinions on that matter. Following high GI diet plans results in postprandial hyperglycaemia and hyperinsulinemia, especially in obese patients and in patients with insulin resistance (Kendall et al., 2006; Barclay et al., 2021).

Data published by Brand-Miller et al. (2003) indicated that different products with identical GL values have the same impact on the profile of postprandial glycemia and insulinemia. The analysis included 10 different products with the same GL values and 9 resulted in similar glycaemic response. The lowest glucose concentration was observed after the consumption of lentils that has lower GI value and require more time to be digested and absorbed (Brand-Miller et al., 2003).

This was also supported by the results of the studies indicating similar glycaemic reactions after consumption of products differing in the content of carbohydrates over two times. The analysis included 5 meals of different nutritional composition and it was found that both values (the GI and the total content of carbohydrates) are necessary to be able to determine the glycaemic response. Thus, glycaemic response depends also on the volume of the meal. When meals had similar GI values, glycaemic and insulin responses were the more prominent the higher the content of carbohydrates was (Adamska and Górska, 2008; Alshahrani et al., 2023; Chikwetu and Younes, 2024).

Different diabetes associations present different opinions on the low GI/GL diets. The American Diabetes Association (ADA, 2007) considers that low GI diets may result in lower postprandial hyperglycaemia, however it emphasizes that there is not enough evidence in order to recommend this diet plan as the primary nutrition strategy for treating diabetes. The European Association for the Study of Diabetes (EASD, 2000) recommends replacing products with high GI values with the ones with lower GI values. The Polish Diabetes Association (2008) recommends choosing products with GI values below 50 and lowering the amount of consumed carbohydrates. Just three years ago it was recommended to cover 50–60% of daily energy requirement with carbohydrates while now it is recommended that carbohydrates should comprise 45–50% of the daily energy requirement. The recommended lower amount of carbohydrates and choosing products with low GI values obviously lowers the glycaemic load of a diet (Adamska and Górska, 2008; Vaduganathan et al., 2020).

4. CONCLUSION.

Including only the amount and calorific value of food on its packaging is not enough to enable consumers with type 2 diabetes to properly control their glycemia. In the authors' opinion it is necessary to consider including information on glycaemic index and glycaemic load on food product's packaging, especially when it comes to functional foods that consumers with type 2 diabetes trust the most. Unfortunately, both the Nutri-Score health-promoting food labelling system (the 5-Colour Nutrition Label, 5-CNL) and the Mediterranean Index – the Med Index, have no regard to the glycaemic index or the glycaemic load.

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