

PART I. DISEASES AND PROBLEMS DISTINGUISHED BY WHO AND FAO  
DZIAŁ I. CHOROBY I PROBLEMY WYRÓŻNIONE PRZEZ WHO I FAO

KNOWLEDGE OF PROFESSIONALLY ACTIVE NURSES FROM THE PODKARPACKIE  
AND MAŁOPOLSKIE VOIVODESHIPS ON SELECTED ALLERGIES AND FOOD  
INTOLERANCES

WIEDZA PIELEŃNIAREK CZYNNYCH ZAWODOWO Z WOJEWÓDZTWA  
PODKARPACKIEGO I MAŁOPOLSKIEGO NA TEMAT WYBRANYCH ALERGII  
I NIETOLERANCJI POKARMOWYCH

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zaplanowanie badań  
B. Data collection/entry  
zebranie danych  
C. Data analysis/statistics  
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D. Data interpretation  
interpretacja danych  
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#### Summary

**Background.** This work aimed to assess nurses' knowledge about gluten allergies and lactose intolerance, as well as the principles of dietotherapy in these diseases.

**Material and methods.** This study used a diagnostic survey method. The research tool was the authors' survey questionnaire. The study was conducted in January and February of 2019 on a group of 306 nurses from the voivodeships of Podkarpackie and Małopolskie. Verification of differences between variables was made using the chi-square ( $\chi^2$ ) independence test assuming a statistical significance  $p$ -value of  $<0.05$ .

**Results.** Research showed that the level of knowledge in these areas increases significantly with nurses' age and job seniority. Among nurses working for more than 15 years, a satisfactory level of knowledge was achieved by 79.5% of respondents. An acceptable level of knowledge about the selected food allergies and intolerances was more frequently achieved among nurses from Podkarpackie (76.5%) than nurses from Małopolskie (51.0%). Respondents that actively engage themselves in solving other people's problems (80%) showed more profound knowledge of the discussed topic.

**Conclusions.** The study group showed sufficient knowledge of gluten allergies, lactose intolerances, and dietotherapy for these diseases. Age and job seniority have a significant influence on the level of knowledge of nurses.

**Keywords:** low lactose diet, lactose-free diet, gluten-free diet, lactose intolerance, gluten, allergy

#### Streszczenie

**Wprowadzenie.** Celem pracy była ocena wiedzy pielęgniarek na temat alergii na gluten oraz nietolerancji laktozy, jak również zasad dietoterapii w tych jednostkach chorobowych.

**Materiał i metody.** W badaniach zastosowano metodę sondażu diagnostycznego. Narzędziem badawczym był autorski kwestionariusz ankiety. Badania przeprowadzono w styczniu i lutym 2019 r. w grupie 306 pielęgniarek i pielęgniarzy z województw: podkarpackiego i małopolskiego. Weryfikacji różnic między zmiennymi dokonano przy użyciu testu niezależności  $\chi^2$ , przyjmując poziom istotności  $p < 0,05$ .

**Wyniki.** Badania wykazały, iż poziom wiedzy w omawianym zakresie wzrastał istotnie wraz z wiekiem i stażem pracy pielęgniarek/pielęgniarzy. Wśród osób pracujących dłużej niż 15 lat zadowolający poziom prezentowało 79,5% ankietowanych. Stwierdzono, że satysfakcjonujący poziom wiedzy na temat wybranych alergii i nietolerancji pokarmowych posiadały częściej pielęgniarki/pielęgniarze z województwa podkarpackiego (76,5%) niż z małopolskiego (51,0%). Respondenci aktywnie angażujący się w rozwiązywanie problemów innych osób (80%) wykazali się większą wiedzą w omawianym temacie.

**Wnioski.** Badana grupa wykazała się dostateczną wiedzą na temat alergii na gluten i nietolerancji laktozy oraz dietoterapii w tych chorobach. Wiek i staż pracy wpływają na poziom wiedzy pielęgniarek/pielęgniarzy.

**Słowa kluczowe:** dieta niskolaktozowa, dieta bezlaktozowa, dieta bezglutenowa, nietolerancja laktozy, gluten, alergja

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## Introduction

Food intolerances, regarding gluten or lactose, have become very common these days throughout the world. The majority of people struggle with a wide range of gastrointestinal afflictions, such as abdominal pain, nausea, and diarrhea. Typically patients do not take these symptoms seriously and mistake these conditions for indigestion or food poisoning. Often the first diagnosis is not always correct. Common food intolerances can manifest in many different ways. Derangements of the digestive, respiratory, and nervous systems can be observed. Dysfunction of various internal organs occurs quite often which can produce systematic signs/symptoms such as malabsorption syndrome, metabolic disorders, anemia, and malaise [1,2].

The symptoms of food intolerances are associated with an absence or insufficient amount of enzymes responsible for digesting a given substance [3]. Lactose intolerance is the result of a deficiency in lactase, an enzyme that hydrolyses lactose into monosaccharides within the small intestine [4]. Abnormal lactose hydrolysis resulting from a deficiency of lactase is responsible for its digestion ultimately leading to the improper absorption of this carbohydrate [5]. The treatment of non-allergic food hypersensitivities, especially lactose intolerance, is through an elimination diet which must be low in lactose or lactose-free [6].

In lactose intolerance, the diagnosis is more straightforward and a number of diagnostic tests are available. In addition, there has been an abundance of diagnostic research into tests such as the hydrogen breath test and lactose tolerance blood test enabling us to diagnose lactose intolerance quickly and easily. There are three types of lactose intolerance: alactasia, hypolactasia, and secondary lactase deficiency [7-10].

Lactose sensitivities are treated with a low-lactose or lactose-free diet and various supplements containing lactase enzymes. The elimination of milk and dairy products from the diet, as well as other foods in which lactose was added, can provide relief of symptoms [6,11].

The diagnosis and treatment of gluten sensitivities are far more complicated. Gluten intolerances can cause a number of diseases and are divided into three groups: autoimmune (celiac disease, Dühring's disease, gluten ataxia), allergic (inhalation and food allergies to wheat, wheat-dependent exercise-induced anaphylaxis, contact urticaria) and non-immunologic/non-allergic (gluten hypersensitivity) [12-14].

The available diagnostic modalities are a gluten challenge test or small intestine biopsy. The latter is performed to examine intestinal villi and determine the level of damage caused by celiac disease or dermatitis herpetiformis. The results of the examination are often inconclusive and diagnostics may last for months due to the similarity of findings in gluten-dependent conditions. To alleviate symptoms, one must follow a gluten-free diet. In most diseases caused by gluten intolerances, the diet has to be followed for the patient's whole life [4-8].

An increase in food intolerances has been observed in the hospital environment. More and more patients require a gluten-free and lactose-free diet or are undergoing diagnostic tests to determine the presence of food intolerances [3-6]. As a group of health experts, all nurses are responsible for professional divisional nursing, as well as providing health education to patients and their families. Nurses must introduce the principles of dietotherapy, explain the disease, and explain the symptoms of the disease. They also teach patients how to live with the disease and prepare the patient to deal with self- and body-care. That is why their knowledge of these topics is crucial.

This study aimed to assess the knowledge of professionally active nurses from the voivodeships of Podkarpackie and Małopolskie about gluten allergies, lactose intolerance, and the principles of dietotherapy in these diseases.

## Material and methods

The method used in this study was a diagnostic survey and the research tool was the author's survey questionnaire. It consisted of 26 questions: open and closed questions, as well as single and multiple-choice questions. The questions covered food allergies and intolerances (definitions and symptoms) and assessed the knowledge of participants on this subject.

The study was conducted in 306 professionally active nurses who are current students in the master's program at the University of Applied Sciences' Nursing Department in Tarnów, Poland. Every respondent agreed to participate in the research. The study was carried out in January and February of 2019. The time needed to complete the questionnaires was irregular. One of the most important issues during the completion of the surveys was to maintain anonymity and ensure they were completed voluntarily. All questionnaires had complete responses to all questions and thus none were rejected. The correctness of each answer and level of knowledge were verified objectively. Each respondent was able to choose the correct answer from the given options. The respondents came from the voivodeships of Podkarpackie and Małopolskie (Poland).

The assessment of differences between variables was performed using the chi-square ( $\chi^2$ ) independence test, assuming a statistical significance  $p$ -value of  $<0.05$ . The calculations were done using the IBM SPSS Statistics 20 program.

### Characteristics of the research group

There were 306 respondents in the study. Women constituted 80.4% of participants while 19.6% were men (Table 1).

**Table 1.** Demographic characteristics of the respondents

Variable		N	%
Sex	women	246	80.4
	men	60	19.6
Age	20-30 years old	114	37.3
	31-40 years old	72	23.5
	41-50 years old	102	33.3
	>50 years old	18	5.9
Education	secondary (completed medical high school or medical-vocational college)	6	2.0
	higher I degree (bachelor's degree)	174	56.9
	higher I degree (bachelor's degree) and specialization	117	38.1
	higher II degree (master's degree)	6	2.0
Place of living	higher II degree (master's) and specialization	3	1.0
	village	153	50.0
	town up to 50,000 residents	75	24.5
	town up to 100,000 residents	42	13.7
	town up to 250,000 residents	18	5.9
Job seniority	town >250,000 residents	18	5.9
	<10 year	97	31.7
	10-20 years	103	33.7
	21-30 years	106	34.6

## Results

The study identified that people from the Podkarpackie voivodeship more often correctly answered the question about gluten's influence on the digestive system in patients suffering from food allergies (80.4%) and more often knew (68.6%) what lactose intolerance was. There were no other statistically significant differences between the correctness of responses to individual questions and the voivodeship from which the respondents came (Table 2).

**Table 2.** Accuracy of answers versus voivodeship

Answers		Voivodeship				p
		Małopolskie		Podkarpackie		
		N	%	N	%	
Knowing what a food allergy is	lack of knowledge	75	49.0	54	35.3	0.1604
	having knowledge	78	51.0	99	64.7	
Knowing what food intolerance is	lack of knowledge	90	58.8	63	41.2	0.0747
	having knowledge	63	41.2	60	58.8	
Knowing what gluten is	lack of knowledge	84	54.9	63	41.2	0.1654
	having knowledge	69	45.1	90	58.8	

Being familiar with a sign symbolizing gluten-free foods	lack of knowledge	12	7.8	21	13.7	0.3382
	having knowledge	141	92.2	132	86.3	
Knowing about the immediate symptoms of a gluten allergy	lack of knowledge	33	21.6	48	31.4	0.2618
	having knowledge	120	78.4	105	68.6	
Being familiar with naturally gluten-free grains	lack of knowledge	78	51.0	48	37.3	0.1627
	having knowledge	75	49.0	96	62.7	
Knowing the impact gluten has on the digestive system of a person who struggles with food allergies	lack of knowledge	66	43.1	30	19.6	0.0104
	having knowledge	87	56.9	123	80.4	
Opinion on the most common complications of not applying a gluten-free diet	lack of knowledge	57	37.3	60	39.2	0.8385
	having knowledge	96	62.7	63	60.8	
Knowing what lactose is	lack of knowledge	66	43.1	42	27.5	0.0974
	having knowledge	87	56.9	111	72.5	
Knowing the name of the enzyme responsible for the hydrolysis of lactose	lack of knowledge	51	33.3	48	31.4	0.8324
	having knowledge	102	66.7	105	68.6	
Knowing about the part of the digestive tract in which hydrolysis of lactose takes place	lack of knowledge	45	29.4	60	39.2	0.2970
	having knowledge	108	70.6	63	60.8	
Knowing what lactose intolerance is	lack of knowledge	99	64.7	48	31.4	0.0008
	having knowledge	54	35.3	105	68.6	
Being familiar with the typical symptoms that occur in the case of lactose intolerance	lack of knowledge	51	33.3	42	27.5	0.5184
	having knowledge	102	66.7	111	72.5	
Knowing about groups of products that need to be eliminated in case of lactose intolerance	lack of knowledge	45	29.4	39	25.5	0.6572
	having knowledge	108	70.6	114	74.5	

Notes: Significance level  $p < 0.05$ ;  $\chi^2$  independence test.

The level of knowledge on selected allergies and intolerances was rated based on 14 survey questions (no. 9-22). Correct answers were assigned 1 point and incorrect answers 0 points. The sum of points was in the range of 0-14 points. Therefore, the results were divided into two groups assuming that a satisfactory level of knowledge was when a respondent obtained over 50% correct answers (i.e. 8-14 points).

It was found that 63.7% of nurses had a satisfactory level of knowledge of the selected allergies and intolerances. An unsatisfactory level of knowledge on the subject was identified in 36.3% of the respondents. There were no statistically significant differences between the level of knowledge on selected food allergies and intolerances and the sex of the respondents.

The level of expertise in this area increased significantly with a nurse's age. In the 20-30 years of age group, 44.7% of respondents had a satisfactory level of knowledge. However, among respondents over 40 years of age, 80.0% had an adequate level of expertise. The differences were statistically significant (Table 3).

**Table 3.** The level of knowledge on selected food allergies and intolerances and the age of respondents

The level of knowledge on selected food allergies and intolerances	Age					
	20-30		31-40		over 40	
	N	%	N	%	N	%
unsatisfactory	63	55.3	24	33.3	24	20.0
satisfactory	51	44.7	48	66.7	96	80.0
<b>p-value</b>	<b>0.0050</b>					

Notes: Significance level  $p < 0.05$ ;  $\chi^2$  independence test.

The respondents' place of residence did not significantly affect the level of knowledge about gluten allergies or lactose intolerances. There were slight differences that suggested that respondents with higher education or second degrees and/or specialization had a more satisfactory level of knowledge about food intolerances to gluten and lactose (71.4%) than respondents with only the first degree without specialization or only secondary education (58.3%).

It was found that the level of knowledge increased significantly with increasing experience in nursing. Among people with less than ten years of work experience, 36.1% had a satisfactory level of knowledge about gluten allergies and lactose intolerances. In the group of people with 11-20 years of work experience, there were 75.7% of respondents with a satisfactory level of knowledge. Additionally, respondents with over 20 years of work experience, achieved a satisfactory level of knowledge in 75.5% of respondents (Table 4).

**Table 4.** The level of knowledge on selected food allergies and intolerances and job seniority

The level of knowledge on selected food allergies and intolerances	Job seniority					
	less than 10 years		11-20 years		21-30 years	
	N	%	N	%	N	%
unsatisfactory	62	63.9	25	24.3	26	24.5
satisfactory	35	36.1	78	75.7	80	75.5
<b>p-value</b>	<b>0.0091</b>					

Notes: Significance level  $p < 0.05$ ;  $\chi^2$  independence test.

It was shown that nurses from Podkarpackie more often possessed a satisfactory level of knowledge than ones from Małopolskie (76.5% and 51.0%, respectively). The differences were statistically significant (Table 5).

**Table 5.** The level of knowledge on selected food allergies and intolerances by voivodeship

The level of knowledge on selected food allergies and intolerances	Voivodeship			
	Małopolskie		Podkarpackie	
	N	%	N	%
unsatisfactory	75	49.0	36	23.5
satisfactory	78	51.0	117	76.5
<b>p-value</b>	<b>0.0074</b>			

Notes: Significance level  $p < 0.05$ ;  $\chi^2$  independence test.

Job satisfaction did not significantly affect the respondents' level of knowledge regarding selected food allergies and intolerances.

The analysis of the data collected by the authors showed that a satisfactory level of knowledge was more common among people actively involved in solving other people's problems (80.0%). People interested in the problems of others but without much involvement in them had a less satisfactory level of knowledge (59.6%). The lowest value (30.0%) was observed in those concerned only with their own matters. The differences were statistically significant (Table 6).

**Table 6.** The level of knowledge on selected food allergies and intolerance

The level of knowledge on selected food allergies and intolerances	The choice of the best attitude to life					
	taking care of your problems only		interest in other people's problems, without engaging in them		actively engaging in solving other people's problems	
	N	%	N	%	N	%
unsatisfactory	21	70.0	69	40.4	21	20.0
satisfactory	9	30.0	102	59.6	84	80.0
<b>p-value</b>	<b>0.0094</b>					

Notes: Significance level  $p < 0.05$ ;  $\chi^2$  independence test.

## Discussion

World statistics show that 17 million Europeans suffer from food allergies. Allergic symptoms were declared by approximately 40% of respondents in research conducted by the Epidemiology of Allergic Diseases program (ECAP) in Poland. This shows that Poland is one of the leading countries where allergy symptoms affect a large

group of residents [15]. According to Zatwarnicki, dairy intolerances affect 37% of society. Gluten is the second most common allergen classified as an ingredient that causes intolerances [8]. Ścibor et al. showed that about 10-25% of the population with food allergies also have gluten allergy symptoms [16]. Based on their research, Kalinowski and Mirosław have shown that cereal products are the third most common food-causing allergies in children (36%) diagnosed with food intolerances [17]. After a search of scientific references (Polish Medical Library, PubMed), no publications on nursing staff's knowledge about lactose intolerances and gluten allergies were found.

A study by Kowalski et al. conducted among school nurses in Łódź, Poland, was found during the literature analysis. These results showed that 94% of respondents declared that they knew the symptoms of food allergies but were not always able to identify or list them correctly [18].

The current study demonstrated that the vast majority of the surveyed nurses (69.6%) knew the main symptoms of lactose intolerance and almost 75% correctly answered the question about the first symptoms of gluten sensitivity. Similar results regarding the knowledge of pediatricians and family physicians in the United States were obtained by Gupta et al. who showed that 61% responded correctly [19].

The data collected in the current study showed that 57.8% of respondents knew the definition of food allergy. Half of the surveyed nurses also correctly explained the concept of food intolerance. According to Carlisle et al., more than 85% of nurses reported a moderate to high proficiency in understanding food allergy and food intolerance definitions [20].

The results presented by Kalinowski et al. showed that 48% of surveyed mothers, whose children suffer from food intolerances, did not know the differences between the discussed concepts, and another 32% said that they did not see the difference [17]. In a study of nutritional knowledge among people with celiac disease and gluten allergies, Heś et al. showed that almost every respondent knew that gluten is a vegetable protein. The respondents were also able to identify the characteristic symptoms of gluten sensitivities in celiac disease [21]. Research among parents and children in the UK confirmed that consumers possess a relatively good knowledge of food allergens and are motivated in their personal allergen avoidance in the management of food allergies [22].

In the current study conducted among nurses, only 52% of respondents correctly categorized gluten as a protein. Approximately 68% of respondents gave the correct answer when asked about the effects of gluten on the digestive system in patients suffering from this protein intolerance.

Kalinowski et al. examined parents of children hospitalized for food allergies at the Antoni Gębala Clinical Hospital in Lublin (Poland) and found that the most reliable source of information on food intolerances for the respondents was the Internet and other family members. It was also shown that 72% of surveyed parents did not know what lactose was despite their children being tested for lactose intolerance with only 14% of them giving the correct answer [17]. The current study shows that nurses expand their knowledge of gluten allergies and lactose intolerances using professional references — 37.3% of respondents used medical articles and books. Almost 65% of respondents knew that lactose is milk sugar. In the study by Golemo et al., 74% of surveyed parents with children suffering from food intolerances assessed their knowledge about food allergies as poor. However, over 80% of the respondents expressed a willingness to expand their knowledge in this regard [23]. Similar low results of parents' knowledge about allergies and inadvisable foods were obtained by Kapoor et al [24]. Research by Lee and Liu also showed that knowledge in this area was not high. Research conducted at a US university among campus dining employees found that they were unable to distinguish the differences between food intolerances and food allergies [25].

The interpretation of the current study results shows that only 8.8% of nurses assessed their knowledge as very low, while over 40% of the respondents described the level of their knowledge as average. In addition, less than 60% of respondents expressed a willingness to expand their knowledge. Golemo et al. showed that 84% of respondents considered their doctor to be the most competent person to provide patients with recommendations on the management, prevention, and treatment of food allergies. Only 8% of respondents believed that nurses were also adequately trained in this field [23].

It is an undeniable fact that the nursing staff plays an educational and therapeutic role for patients. In the current study, respondents were asked about their subjective opinion on their knowledge of food allergies and intolerances. The respondents' task was to decide whether they felt competent to educate, provide advice and guidance, and prepare patients for self-care of gluten allergies or lactose intolerances. The majority of nurses (34.3%) chose the answer "don't know", 29.4% said "rather no", and a little over 25% chose the affirmative answer.

The current study results showed a satisfactory level of knowledge among nursing staff (63.7%) on allergies to gluten and lactose intolerances and the principles of diet therapy. It was found that the level of knowledge of

respondents in the discussed topics increased significantly with experience and with the province in which they worked. However, Gupta et al. showed that both years in practice and practice location had no impact on the level of knowledge of doctors [19].

The current research study shows that the vast majority of nurses have basic knowledge of the examined topics. Additionally, almost 60% of respondents expressed a willingness to learn more. Therefore, it seems reasonable to organize training and courses in diet therapy and treatment of food allergies and intolerances.

Given the continuous increase in childhood food allergies, the threat posed by food-induced anaphylaxis, and the frequency with which nurses encounter these patients makes it imperative that efforts be made to better equip nurses in providing care and education for children with food allergies.

#### *Limitations of the study*

The main limitations of the study involve the questionnaire. The questionnaire was not validated by previous research and there was no indication as to whether the questions were separated into different domains of knowledge or whether they were similarly weighted in the final score. Additionally, there was no indication as to why the minimum threshold for the questionnaire to be satisfactory was set at 50% of correct answers. Certainly, it is necessary to conduct further research, taking into account a more detailed description of the questionnaire.

#### **Conclusions**

1. The more advanced the respondents' age and experience, the greater their knowledge of food allergies and intolerances.
2. Nurses actively involved in solving other people's problems showed a higher level of expertise than respondents who only took care of their own matters.
3. A vast majority of respondents were knowledgeable about the prominent symptoms of gluten allergies and lactose intolerances.
4. Nurses from the Podkarpackie voivodeship more often had a satisfactory level of knowledge than Małopolskie voivodeship respondents.
5. Knowledge declared by respondents was equivalent to their actual knowledge.

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#### **References:**

1. Modrzyński M, Modrzyńska K. [The diagnostic significance of specific IgG antibodies in food allergy and intolerance]. *Alergoprofil*. 2013; 9(1): 11-15 (in Polish).
2. Cambridge Diagnostics. [Classification and terminology of food hypersensitivity]. Warszawa: NextGen Group; 2017 (in Polish).
3. Michalczyk M, Sybilski AJ. [Food intolerances]. *Pediatrics i Medycyna Rodzinna*. 2010; 6(3): 189-93 (in Polish).
4. Markłowska-Dzierżak M. [Lactose intolerance – not only a gastric problem]. Warszawa: SYNEVO sp. z o.o.; 2017 (in Polish).
5. Mądry E, Fidler E, Walkowiak J. Lactose intolerance – current state of knowledge. *Acta Scientiarum Polonorum Technologia Alimentaria*. 2010; (9): 342-350.
6. Konińska G, Marczevska A, Sabak-Huzior P, Źródłak M. [Celiac disease and a gluten-free diet]. 8th edition. Warszawa: Polskie Stowarzyszenie Osób z Celiakią i na Diecie Bezglutenowej; 2018 (in Polish).
7. Hutyra T, Iwańczak B. [Lactose intolerance: pathophysiology, clinical symptoms, diagnosis and treatment]. *Polski Mercuriusz Lekarski*. 2009; 26(152): 148-152 (in Polish).
8. Zatwarnicki P. [Lactose intolerance – causes, symptoms, diagnostics]. *Pielęgniarstwo i Zdrowie Publiczne*. 2014; 4(3): 273-276 (in Polish).
9. Instytut Jakości JCI. [Lactose intolerance. Information brochure]. Kraków: Jagiellońskie Centrum Innowacji Sp. z o.o.; 2017 (in Polish).

10. Ugidos-Rodríguez S, Matallana-González MC, Sánchez-Mata MC. Lactose malabsorption and intolerance: a review. *Food & Function*. 2018; 9(8): 4056-4068. <https://doi.org/10.1039/C8FO00555A>
11. Lange E. [Selected elimination diets]. In: Włodarek D, Głabska D, Lange E, Kozłowska L., editors. [Diet therapy]. Warszawa: Wydawnictwo Lekarskie PZWL; 2014 (in Polish).
12. Sapone A, Bai JC, Ciacci C, Dolinsek J, Green PH, Hadjivassiliou M, et al. Spectrum of gluten-related disorders: consensus on new nomenclature and classification. *BMC Med*. 2012; 10: 13. <https://doi.org/10.1186/1741-7015-10-13>
13. Obtulowicz K, Waga J, Dyga W. [Gluten – mechanisms of intolerance, symptoms and treatment possibilities of IgE-related allergy for gluten in the light of actual clinical and immunological studies]. *Przegl Lek*. 2015; 72(12): 747S-753S (in Polish).
14. Roszkowska A, Pawlicka M, Mroczek A, Bałabuszek K, Nieradko-Iwanicka B, Non-celiac gluten sensitivity: a review. *Medicina*. 2019; 55(6): 222. <https://doi.org/10.3390/medicina55060222>
15. Samoliński B, Raciborski F, Lipiec A, Tomaszewska A, Krzych-Fałta E, Samel-Kowalik P, et al. [Epidemiology of allergic diseases in Poland]. *Alergologia Polska – Polish Journal of Allergology*. 2014; 1(1): 10-18 (in Polish). <https://doi.org/10.1016/j.alergo.2014.03.008>
16. Ścibor K, Ostrowska-Nawarycz L, Kopański Z, Brukwicka I, Uracz W, Maslyak Z, et al. [Gluten intolerance as the problem of the 21st century]. *Journal of Clinical Healthcare*. 2015; 1: 18-23 (in Polish).
17. Kalinowski P, Mirosław K. [Knowledge of parents on alimentary allergy occurring in their children]. *Medycyna Ogólna i Nauki o Zdrowiu*. 2014; 20(1): 88- 89 (in Polish).
18. Kowalski M, Majkowska-Wojciechowska B, Wardzyńska A, Wysocka M, Kowalski M. [The level of food allergy knowledge among primary school personnel]. *Alergia Astma Immunologia*. 2009; 15(2): 113-120 (in Polish).
19. Gupta RS, Springston EE, Kim JS, Smith B, Pongracic JA, Wang X, et al. Food allergy knowledge, attitudes, and beliefs of primary care physicians. *Pediatrics*. 2010; 125(1): 126-132. <https://doi.org/10.1542/peds.2009-1116>
20. Carlisle SK, Vargas PA, Noone S, Steele P, Sicherer SH, Burks AW, et al. Food allergy education for school nurses: a needs assessment survey by the Consortium of Food Allergy Research. *JOSN*. 2010; 26(5): 360-367. <https://doi.org/10.1177/1059840510369482>
21. Heś M, Jędrusek-Golińska A, Górecka D, Kobus-Cisowska J, Zajac M. [The study of the nutritional knowledge of people with coeliac disease and gluten allergy from the Poznań area]. *Probl Hig Epidemiol*. 2013; 94(2): 389-392 (in Polish).
22. Soon JM. Food allergen knowledge, attitude and practices among UK consumers: a structural modelling approach. *Food Research International*. 2019; 120: 375-381 <https://doi.org/10.1016/j.foodres.2019.03.008>
23. Golemo K, Rozensztrauch A, Janiga A, Kłodzińska A. [Parent's knowledge on children alimentary allergy]. *Współczesne Pielęgniarstwo i Ochrona Zdrowia*. 2014; 3(4): 81-112.
24. Kapoor S, Roberts G, Bynoe Y, Gaughan M, Habibi P, Lack G. Influence of a multidisciplinary paediatric allergy clinic on parental knowledge and rate of subsequent allergic reactions. *Allergy*. 2004; 59: 185-191. <https://doi.org/10.1046/j.1398-9995.2003.00365.x>
25. Lee S, Liu P. Food intolerance or food allergy? Exploring food safety practices among campus foodservice employees. *Journal of Foodservice Business Research*. 2021; 24(6): 665-682. <https://doi.org/10.1080/15378020.2021.1883795>