

## MILK- FREE DIET FOLLOWED BY BREASTFEEDING WOMEN

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### ABSTRACT

**Background.** Breastfeeding is the most common way of feeding infants. Human milk contains nutrients which are necessary to provide proper growth of a child. Nowadays there aren't any recommendations to follow elimination diet in order to decrease the risk of allergy or baby colic. Only the occurrence of health problems such as lactose intolerance or cow's milk protein allergy in breastfeeding mother or infant should be a reason for eliminating dairy products from diet. It seems to be important to explore the reasons and the frequency of following milk-free diet by breastfeeding women.

**Objectives.** The main purpose of the study was to find the reasons for following milk-free diet by breastfeeding women and making an assessment of their nutrition knowledge and food habits.

**Material and methods.** Thirty-three breastfeeding women following milk-free diet took part in the project. The women were interviewed by the Computer Assisted Web Interview (CAWI) method with an original questionnaire. The results were developed with Spearman's rank correlation, Chi2 test and the gamma coefficient. The statistical significance level for the p-value was <0.05.

**Results.** The main reason for following milk-free diet by the breastfeeding women was the occurrence of hypersensitivity reactions of the children's gastrointestinal system after consuming milk by mother (72% responses). After excluding milk from diet only 42% respondents declared consuming new food products or dietary supplements in order to refill the potential deficiency of nutrients. The majority of respondents also eliminated from diet highly processed food products, fast-food and the carbonated drinks. The most often declared source of information about lactation was Internet (85%). Only 12% respondents asked a nutritionist in order to get the information about breastfeeding.

**Conclusions.** It's necessary to promote a specific nutritional advice about following milk-free diet in breastfeeding women group in order to decrease the health risk connected with low calcium diet.

**Key words:** *milk-free diet, breastfeeding, lactation, elimination diet*

### STRESZCZENIE

**Wprowadzenie.** Karmienie piersią jest najkorzystniejszym modelem żywienia niemowląt. Mleko matki dostarcza niezbędnych składników odżywczych potrzebnych do prawidłowego wzrostu i rozwoju niemowlęcia. Obecnie nie zaleca się profilaktycznego stosowania diet eliminacyjnych w celu zmniejszenia ryzyka wystąpienia objawów alergii bądź kolki niemowlęcej u dziecka. Celowym wydaje się zbadanie powszechności i przyczyn stosowania diety bezmlecznej wśród kobiet karmiących piersią.

**Cel.** Celem pracy była analiza przyczyn stosowania diety bezmlecznej wśród kobiet karmiących piersią oraz ocena świadomości żywieniowej i wybranych zachowań żywieniowych w kontekście stosowania diety eliminacyjnej.

**Material i metody.** Badaniem ankietowym objęto 33 kobiety karmiące piersią, stosujące dietę eliminacyjną. Ankieta została przeprowadzona internetową metodą CAWI (Computer Assisted Web Interview) za pomocą autorskiego kwestionariusza. Do opracowania wyników wykorzystano korelację rang Spearmana, test Chi2 oraz statystykę gamma. Za poziom istotności przyjęto  $p < 0,05$ .

**Wyniki.** Główną przyczyną stosowania diety bezmlecznej wśród ankietowanych było występowanie reakcji nadwrażliwości ze strony przewodu pokarmowego dziecka po spożyciu mleka przez matkę (72% respondentek). Po wykluczeniu mleka z diety jedynie 42% kobiet zadeklarowało wprowadzenie produktów substytucyjnych lub suplementów do diety w celu uzupełnienia potencjalnych niedoborów składników odżywczych. Większość ankietowanych z jadłospisu wykluczyła produkty wysoko przetworzone, np. słone przekąski, słodczyce, żywność typu fast food i napoje gazowane. Najczęściej deklarowanym źródłem informacji o karmieniu piersią był Internet (85%). Jedynie 12% ankietowanych w celu uzyskania informacji dotyczących laktacji korzystało z pomocy dietetyka.

**Wnioski.** Istnieje konieczność edukacji żywieniowej dotyczącej stosowania diety bezmlecznej w grupie kobiet karmiących piersią w celu zapobiegania ryzyka związanego ze zmniejszoną podażą wapnia w diecie.

**Słowa kluczowe:** *dieta bezmleczna, karmienie piersią, laktacja, dieta eliminacyjna*

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## INTRODUCTION

Breastfeeding is the most common way of feeding infants. Human milk contains nutrients which are necessary to provide the proper growth of the child. World Health Organization (WHO) and Polish Society of Gastroenterology, Hepatology and Child Nutrition (Polskie Towarzystwo Gastroenterologii, Hepatologii i Żywienia Dzieci) recommend exclusive breastfeeding for the child's first six months. The risk of occurrence of type 1 diabetes or obesity is lower in breastfed infants in comparison to children fed with infant formula milk [10, 32]. Furthermore, breastfeeding leads to maternal health outcomes including reduction of the postpartum recovery period, decrease the risk of postpartum depression, osteoporosis or miscellaneous types of cancer, particularly endometrial, ovarian or breast cancer [3, 12].

The composition of human milk varies with the duration of breastfeeding. The first fluid produced by mother after delivery is colostrum which is characterized by the highest amount of protein and the lowest energy value. Subsequently, between 5. and 15. day of lactation, the transitional milk is produced. After 15 days of postpartum, mother produces mature milk. In comparison to intermediate milk, the mature milk consists of superior amounts of fat and lactose and lower amount of protein [21]. One of the main components of human milk is fat, particularly triglycerides, phospholipids, sterols, free fatty acids and cholesterol. Fat covers the 50% energy requirements in child's first months. Parallely with an increase of lactation, the content of fat in human milk is higher. It has an effect on the growth of energy value respectively. The principal carbohydrate of human milk is lactose and its content remain on relatively

stable level during lactation, at approximately 7 g/100 ml. The consumption of lactose has no influence on its concentration in human milk. The lactose plays a substantial role in intestinal calcium absorption by lowering the pH in intestines. The content of protein in mature human milk constitutes about 1.4% and 3/4 of it is composed by whey protein. Human milk protein plays both structural and bioactive function. The bioactive compound of human milk protein includes immunoglobulins, lactoferrin, lactoperoxidase or lysozyme [7, 18, 21, 24, 27].

Human milk's composition differs substantially from cow's milk. The general content of protein (3.25%) in cow's milk is higher than in human milk (1.42%) whilst the concentration of lactose in cow's milk is lower (4.88% in cow's milk vs 6.71% in human milk). Furthermore, the proportion of casein is higher in cow's milk in opposition to human milk, where the whey protein is superior. The content of vitamins and minerals is different in both human and cow's milk (Table 1) [22]. The most important allergens in cow's milk are casein and whey protein. The fraction of whey protein with the strongest allergenic potential in cow's milk is  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin, which does not appear in human milk. The epidemiological data indicate that cow's milk allergy occurs in 2.7% children fed by infant formula and 1.8% breastfed children. The prevalence of cow's milk allergy may be associated with the mechanism of tolerance induction, when the child that used to have allergy to cow's milk protein in the past does not induce immune response to cow's milk antigens. The breastfeeding mother must sequentially eliminate cow's milk protein when the infant is allergic to cow's milk [6, 8, 16].

Dairy products should be excluded from diet during lactation only as a consequence of lactose intolerance

Table 1. The content of nutrients in cow's milk and human milk [15]

Nutrient energy value	Cow's milk	Human milk
Protein (% of energy)	3.25	1.42
Fat (% of energy)	3.61	3.64
Lactose (% of energy)	4.88	6.71
Casein (% of protein)	2.51	0.37
Whey (% of protein)	0.57	0.76
Energy value (kcal/g)	674	677
Vitamin A (ug/100 ml)	35.2	60
Vitamin D (ug/100 ml)	0.29	0.01
Vitamin E (ug/100 ml)	113.5	0.35
Vitamin C (ug/100 ml)	1530	380
K (mg/l)	1204	491
Na (mg/l)	504	15
Ca (mg/l)	1287	35
P (mg/l)	996	15
Mg (mg/l)	134	2.8

or cow's milk protein allergy in breastfeeding mother or infant. It seems critical to discover the reasons and the frequency of following milk-free diet in breastfeeding women.

The aim of this study was to discover the reasons of following milk-free diet and explore dietary habits and nutritional knowledge in breastfeeding women.

## MATERIAL AND METHODS

Thirty-three breastfeeding women following milk-free diet at the age of 19 - 25 (18%), 26 - 30 (32%) and over 30 years old were recruited into the study. The technique of purposive sampling was used in this research. The women were interviewed by the Computer-Assisted Web Interview (CAWI) method with an original questionnaire including questions related to mother's and infant's health condition, elimination diet, using supplements during lactation and nutritional knowledge. The results were developed with *Spearman's* rank correlation, *Chi*<sup>2</sup> test and the gamma coefficient. The statistical significance level for the p-value was <0.05.

## RESULTS

Excluding milk from diet declared 100% respondents. The main purpose for following milk-free diet by breastfeeding women was the occurrence of hypersensitivity reactions of children's gastrointestinal system after consuming milk by mother (72% responses). More than half of women (60%) declared diagnosed cow's milk allergy in breastfed infants. Another cited reasons for eliminating milk from diet were skin rash or suspicion of cow's milk allergy in

infants (18%). Almost 10% participants claimed that cow's milk was unhealthy or may cause health disorders in children whilst 3% women declared malaise after cow's milk consumption, and 3% respondents followed elimination diet according to podiatrist's recommendations related to the occurrence of cow's milk allergy in siblings (Figure 1).

After excluding milk from diet only 42% respondents declared consuming new food products or dietary supplements in order to refill the potential deficiency of nutrients. The most frequently used supplements were calcium supplements (35% respondents) while 64% women implemented plant-based milk in their diet (oat, rice, coconut, almond) fortified with calcium.

The majority of participants declared the wish to introduce milk to diet after lactation (92% respondents).

Dairy products including yogurt, kefir, buttermilk or cheese were eliminated from 82% women's diet. The main reason for excluding milk were hypersensitivity reactions of the children's gastrointestinal system after consuming milk by mother (67%). Furthermore, 67% women claimed cow's milk allergy in breastfed infants. Only 4% respondents declared malaise after dairy products consumption or position that dairy products were unhealthy and may cause health disorders in children (8%). Another reasons for eliminating dairy products were skin rash or suspicion of cow's milk allergy in children (7%) (Figure 2).

Almost half of women (48%) claimed appropriate pregnancy weight gain. The statistical significance between weight gain and sequence of pregnancy was not observed ( $p > 0.05$ ). Nevertheless, the statistically significant correlation between pregnancy weight gain and cow's milk allergy in child was reported

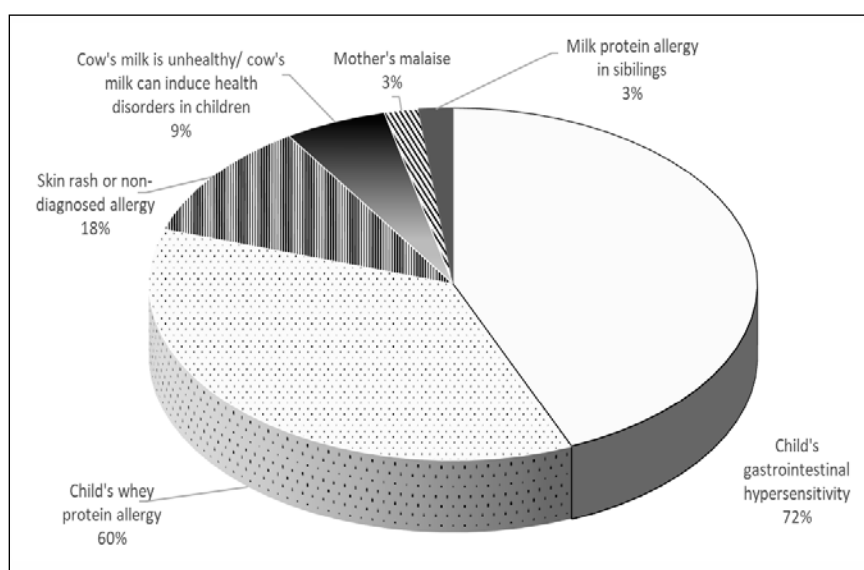


Figure 1. The reasons for eliminating milk from respondents' diet  
Source: own elaboration

( $r = +0.3716$ ,  $p < 0.05$ ). The higher weight gain during pregnancy slightly increased the risk of cow's milk allergy in children (Figure 3).

The occurrence of health problems during pregnancy declared 30% participants. The main health outcomes were gestational diabetes (40%) and blood pressure disorders (30%). The statistical significance between age and health disorders during pregnancy was not observed ( $p > 0.05$ ).

The majority of women declared no occurrence of allergy and food intolerance during pregnancy and lactation. Only 3% of women declared food allergy (yeast, poppy, sunflower seeds) during lactation.

All respondents did not use stimulants including cigarettes whilst occasionally alcohol consumption

was declared by 18% women (Figure 4). The most frequently excluded food apart from dairy products were fast-food (76%), carbonated drinks (49%), hot spices (36%) and fruit and vegetables (24%) (Figure 5). Fruits and vegetables which were eliminated most often included citrus fruit (21%) and bloating products, specifically legumes and onion (15%). The statistical significance referring to elimination of food products was observed ( $p < 0.05$ ). Women excluding carbonated drinks additionally eliminated hot spices from diet ( $r = +0.775$ ). Furthermore, respondents which eliminated grain products with gluten also excluded fish from diet ( $r = +0.633$ ).

The main reason for following elimination diet by respondents were gastrointestinal sensitivity in

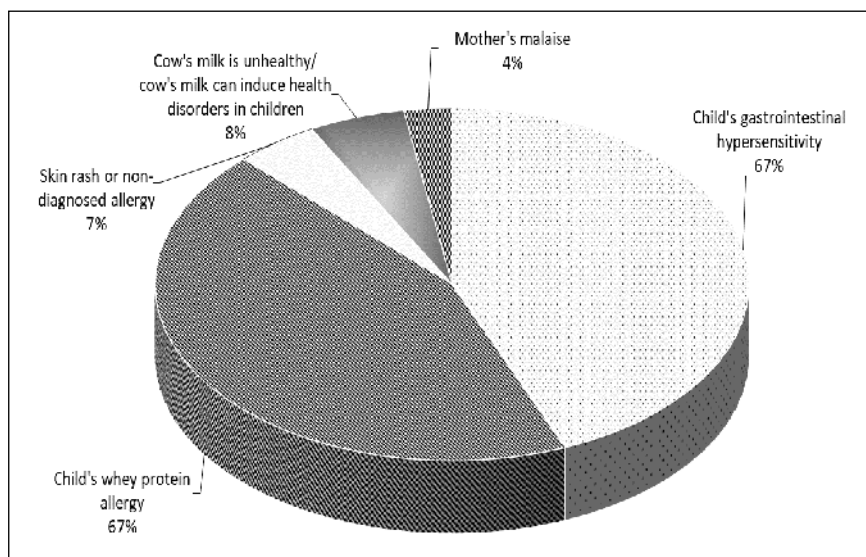


Figure 2. The reasons for eliminating dairy products from respondents' diet  
Source: own elaboration

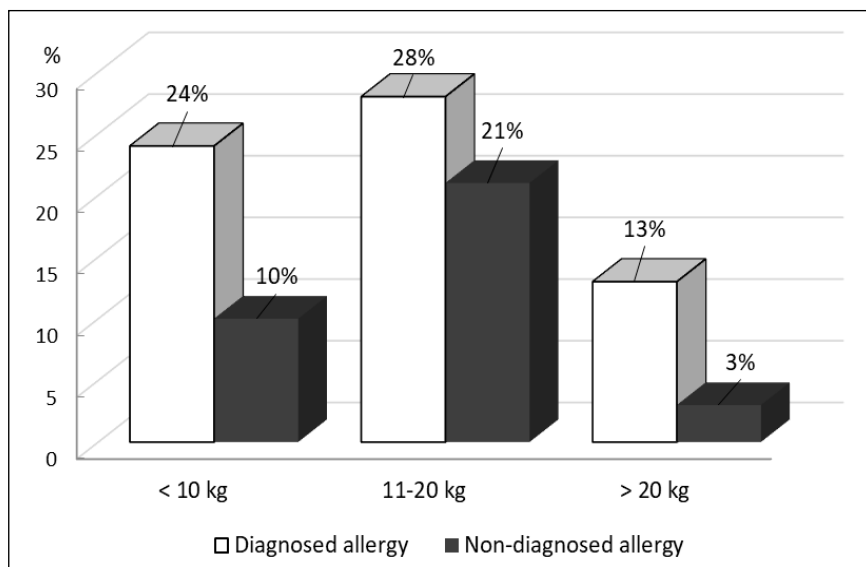


Figure 3. The relationship between the occurrence of cow's milk allergy among children and the weight gain in pregnancy  
Source: own elaboration

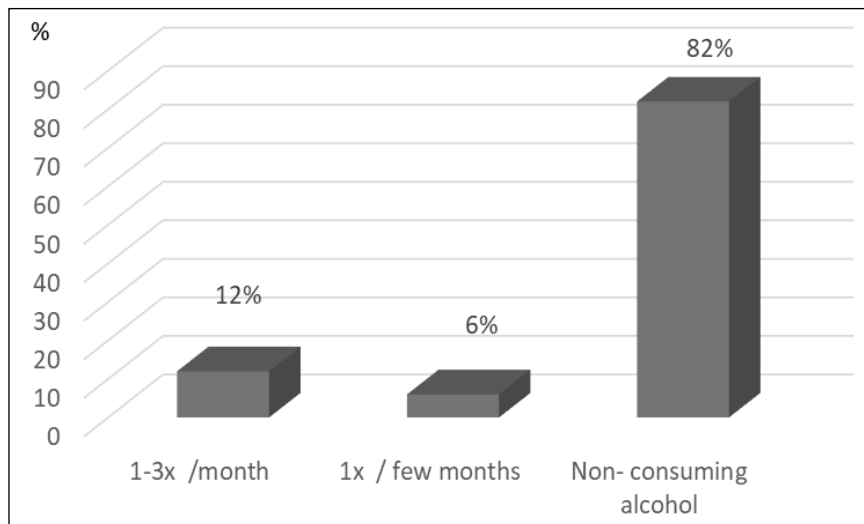


Figure 4. The frequency of drinking alcohol by the respondents  
Source: own elaboration

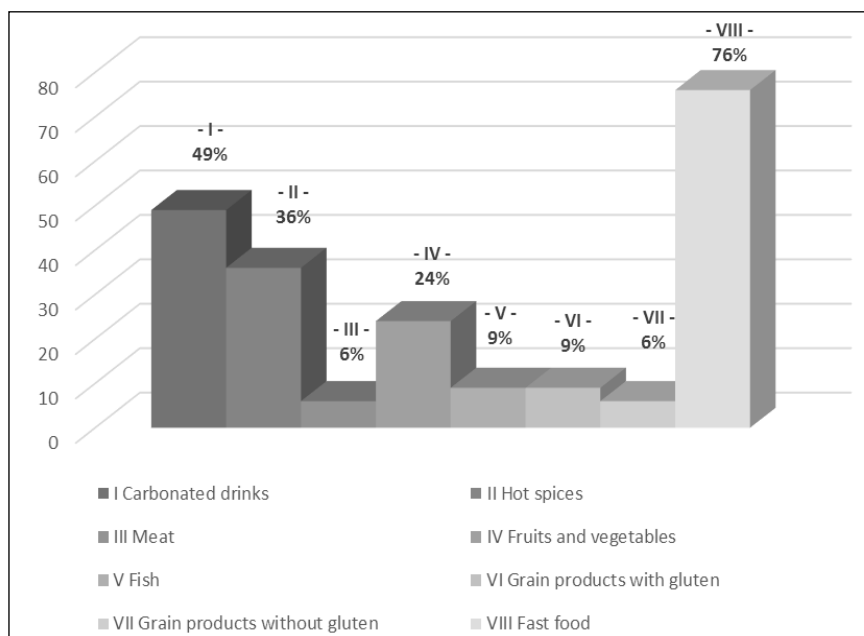


Figure 5. The food products excluded from respondents' diet  
Source: own elaboration

breastfed children (66%) and the occurrence of allergy (63%) in children. The quarter of women declared excluding products from diet in order to prevent children from health disorders induced by selected groups of products (Figure 6). The negative statistical significance between the age and the statement that selected products are not healthy and may have negative influence on child's health was reported ( $Chi^2 = 10,57$ ;  $p < 0,05$ ).

Responding to the questions referring to nutritional knowledge, 57% of participants replied correctly. The questions involved information about milk and dairy product components and their elimination from diet (Figure 7). The statistical significance between location and correct responses was not observed ( $p > 0,05$ ). Nevertheless, the statistical significance

between the age and the question referring to plant-based milk was reported. Younger respondents more frequently replied correctly to the question „Does the plant-based milk have the same nutritional value as cow's milk?“. The association was statistically significant ( $\gamma = 0,5062$ ,  $p < 0,5$ ).

The most frequent source of information about breastfeeding were Internet (85%) and science books and publications (79%). Furthermore, respondents acquired knowledge from midwives (58%), medical doctors (42%) or friends with children (36%). Only 12% participants asked nutritionists in order to get information about breastfeeding (Figure 8). The statistical significance between the age and the source of information about breastfeeding was observed - older women acquired knowledge from

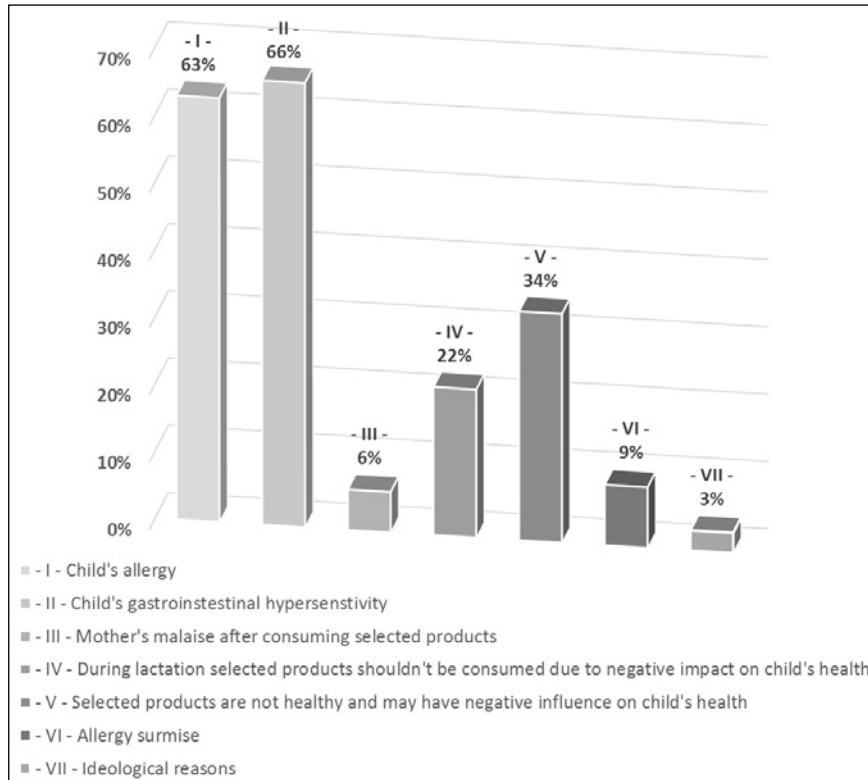


Figure 6. The reasons for excluding food products from respondents' diet  
Source: own elaboration

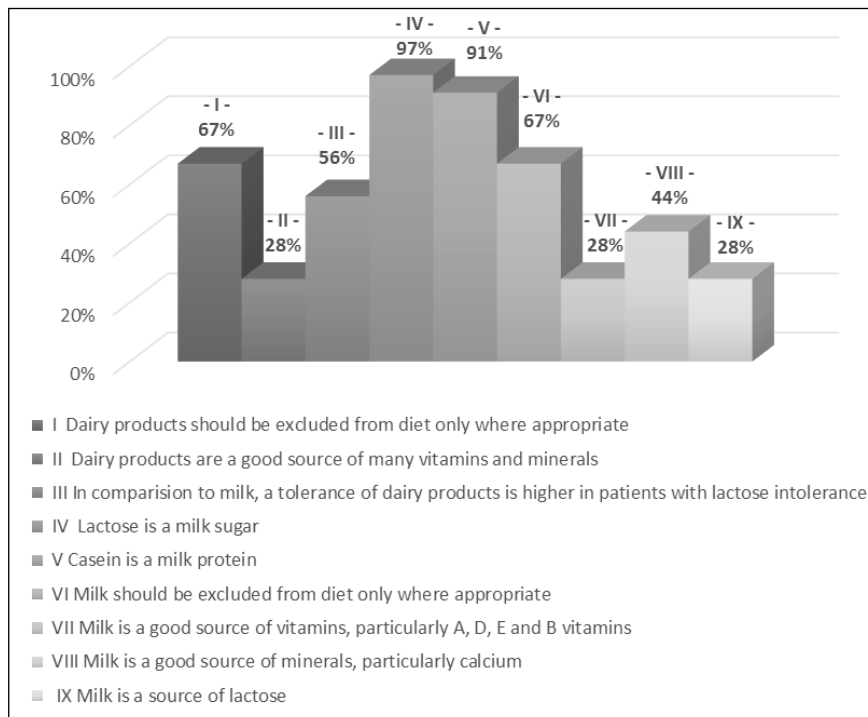


Figure 7. The correct responses about milk given by interviewed women  
Source: own elaboration

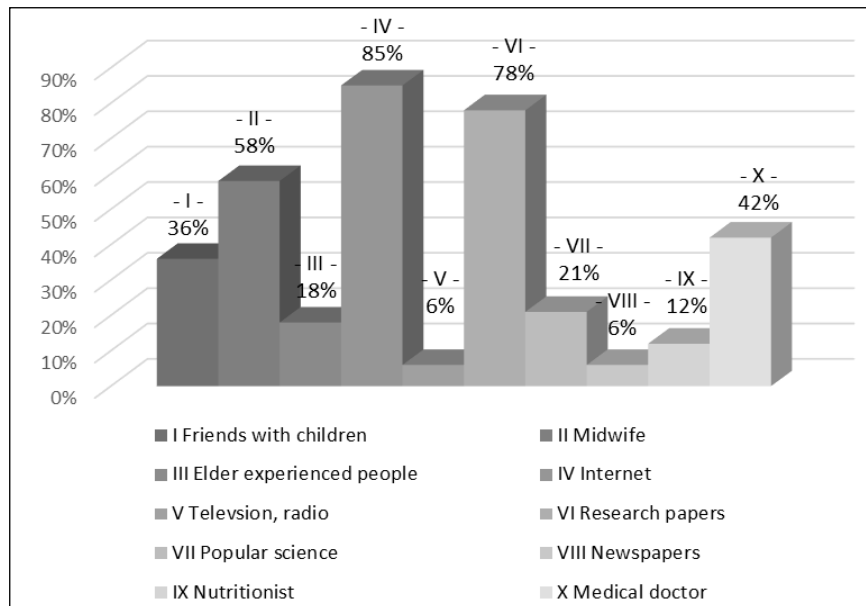


Figure 8. The source of information about breastfeeding in respondents  
Source: own elaboration

radio and television less frequently ( $\gamma = 0.6$ ,  $p < 0.05$ ). Additionally, older respondents asked nutritionists for information referring to lactation more often ( $\gamma = 0.4969$ ,  $p < 0.05$ ).

## DISCUSSION

The major reason for excluding milk and dairy products from respondents' diet was cow's milk allergy in breastfed children. The hypersensitivity for cow's milk is the most frequent health disorder causing gastrointestinal symptoms and skin rash in children and infants [14, 15, 16]. It is proved that an effective method for cow's milk allergy treatment is eliminating milk and dairy products from breastfeeding mothers' and children's diet [17]. Milk and dairy products elimination is connected with lower calcium content which can result in nervous system disorders, bone mass loss and osteoporosis in mother's [14, 19, 26]. Nevertheless, during lactation the greater resorption of calcium is observed [29]. In this study only 42% participants declared consuming new food products or dietary supplements in order to refill the potential deficiency of nutrients after excluding milk from diet. The similar results were observed in the study by *Adamska et al.* [1], where only 44 % women following milk-free diet used calcium supplements. In the research by *Wawrzyniak et al.* [31] only 11% breastfeeding respondents covered nutritional requirements for calcium. In this study 18% participants did not declare a wish to introduce milk after lactation so that the risk of nutritional deficiency may be increased.

More than a half of respondents (57%) were characterized by high level of nutritional knowledge referring to elimination diet, nutritional value and components of milk and dairy products. In the study

by *Kalinowski and Mirosław* [17] concerning the nutritional knowledge about food allergy in parents, only 23% respondents replied correctly for the question about main carbohydrate in milk – lactose. Additionally, the research by *Gebuza et al.* [11] showed low knowledge - based information about lactation in breastfeeding women. For one of the reasons for this position authors indicated inadequate level of knowledge in health care professionals. In the current study only 12% participants asked nutritionist in order to get the information about breastfeeding. Significantly more frequently, the source of information about breastfeeding for respondents were medical doctors (42%) and midwives (58%). The statistical significance between the age of respondents and the source of information about lactation was observed - older women acquired knowledge from radio and television less frequently. Additionally, older respondents asked nutritionists for information more often. Nevertheless, the most frequent source of acquiring information about breastfeeding by respondents was Internet (85%). Further nutrition education in breastfeeding women and medical health care professionals is required.

The results of this study showed that majority of breastfeeding women were aware of the risk associated with smoking cigarettes and alcohol consumption. The occasionally alcohol using was declared by 18% participants. All respondents did not smoke during lactation. In several studies [2, 9] authors indicated that women smoking cigarettes chose breastfeeding less frequently and stopped breastfeeding more quickly in comparison to non-smoking women. In the current study 25% respondents declared the time of breastfeeding exceeding 12 months.

The positive aspect of diet modification in participants was elimination of highly processed products, carbonated drinks and fast-food. More than 1/3 respondents excluded hot spices, citrus fruit and bloating products from diet. It seems to be induced by „breastfeeding mother stereotype”. One-fifth of the respondents declared eliminating products from diet in order to prevent children from health disorders induced by selected groups of products. The results of this study showed statistically significant association between the age of breastfeeding women and following elimination diet for prevention. Younger women more frequently excluded miscellaneous products during lactation in order to prevent children from health outcomes. Elimination diet used preventively for decreasing the risk of allergy or colic in infants is not recommended [5, 13, 15, 28]. Meta-analysis by *Kramer* and *Kakuma* [20] showed no protective effect of maternal dietary antigen avoidance during lactation on the occurrence of atopic eczema during the first 18 months of life or on positive skin-prick tests to egg, cow's milk or peanut antigen at one, two, or seven years [28]. Evidence from studies suggests that dietary restrictions during pregnancy and lactation are not effective in prevention of food allergy [20].

## CONCLUSIONS

Further nutrition education in breastfeeding women is required in order to prevent the risk of health disorders associated with low calcium content in diet.

### Conflict of interest

*The authors declare no conflict of interest.*

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Received: 03.03.2020

Accepted: 11.05.2020