

Symptoms occurring after Consuming milk among Children, youth and Students with Hypolactasia

¹Agata Marasz, ²Barbara Musiał, ³Beata Brodzińska, ⁴Grażyna Czaja-Bulsa

^{1,2,3,4}Pomorski Uniwersytet Medyczny Zakład Pediatrii i Pielęgniarstwa Pediatrycznego 70 – 204 Szczecin ul. Żołnierska 48, Polska, Poland

E-Mail: agata.marasz@interia.pl, musialb@wp.pl, beata.brod@wp.pl, grazyna.bulsa@wp.pl

DOI: <http://dx.doi.org/10.15520/ijnd.2017.vol7.iss01.181.07-12>

Abstract: Intolerance of milk and its products is often the cause of reducing their consumption. These products are the largest source of readily absorbable calcium.

Using restriction in the diet, substitute products should be introduced, as means of protection against secondary deficiency symptoms. This is important especially among children and adolescents, allowing their proper development.

ADMISSION

Milk belongs to the group of food products that are considered most valuable [1, 2]. For newborns and infants it is the only source of food until the introduction of the supplementary diet meals. For adults on the other hand, it provides necessary nutrients, mainly protein and easily digestible calcium. Cross-sectional studies have shown that milk and its products are the most important source of calcium, which covers about 83% of its necessary consumption among children and about 70% among adults [3, 4].

Calcium is the basic building block of the human body, indispensable for the creation of the bone tissue during childhood and maintaining it in a mature life. It is also essential for the proper functioning of the nervous and muscle system - including the heart muscle that - as well as immune processes [5, 6, 7, 8]. Proper bone mineralization significantly reduces the risk of fractures and osteoporosis, which are now one of the most important social problems. The study, conducted among children and young people from different centers in Poland, revealed significant deficiencies of calcium in the diet of more than half of them [9]. To strengthen the correct eating habits, one should include in the diet of baby, products necessary for its optimal development, which include, among others, milk and dairy products [10, 11].

In Poland, since 1950 the low consumption of milk is observable and despite the significant improvement of its quality, this trend persists. One of the reasons for this may be the intolerance of milk, which is a result of hypolactasia.

MATERIAL AND METHODS

The study group consisted of 200 randomly selected people, 156 girls and 44 boys aged 10 to 23 years, residents of Western Pomerania. They were divided into three age groups: 10 - 14 years old (children, n = 36), 15 - 19 years old (youth, n = 77) and 20 - 23 years old (students, n = 87).

The study protocol consisted of filling in the questionnaire, the execution of the hydrogen breath test (HBT) and evaluation of the prevalence of intestinal discomfort during the test. The questionnaire concerned the frequency of consumption of milk and its products, as well as ailments that occur after ingestion. Patients filled it directly before the test of the HBT.

HBT test has been done using Bedford's Gastrolyze. Patients have been treated with an aqueous solution of lactose in a dose of 2g / kg of body weight, up to 50g. During the test, a time and the type of occurring intestinal ailments had been recorded.

RESULTS

Respondents have reported that among 49 of them (24%) had ailments after consuming milk and its products, significantly more often among children than teenagers and students (47% vs 23% vs 16%; p <0.001). Most often they felt abdominal pain, less frequent: abdominal distension, loose stools, flatulence, and vomiting (16% vs 11% vs 8% vs 7% vs 0.5%) (**Table. 1, Fig.1**). Statistically significant differences between the age groups concerned only the incidence of abdominal pain (p <0.001) between the group of children and youth (44% vs 12%; p <0.001) and a group of children and students (44% vs 8%; p <0.001) (Fig. 1)

Table 1. The frequency and type of adverse reactions occurring after ingestion of milk and dairy products - assessment of the respondents

| Number of subjects | | | | | | | | | |
|-----------------------|-------------------------|------|-------------------------|------|-------------------------|------|--------------------------|------|-------|
| Undesirable reactions | 10-14 years old n=36 | | 15-19 years old n=77 | | 20-23 years old n=87 | | 10-23 years old n=200 | | *p |
| | n | % | n | % | n | % | n | % | |
| Occur | 17 | 47,2 | 18 | 23,4 | 14 | 16,1 | 49 | 24,5 | 0,001 |
| Do not occur | 19 | 52,8 | 59 | 76,6 | 73 | 83,9 | 151 | 75,5 | 0,001 |
| abdominal pain | 16 | 44,4 | 9 | 11,7 | 7 | 8,0 | 32 | 16,0 | 0,001 |
| bulge | 3 | 8,3 | 10 | 12,9 | 9 | 10,3 | 22 | 11,0 | 0,975 |
| loose stools | 4 | 11,1 | 6 | 7,8 | 6 | 6,9 | 16 | 8,0 | 0,490 |
| excessive flatulence | 3 | 8,3 | 7 | 9,1 | 4 | 4,6 | 14 | 7,0 | 0,305 |
| vomiting | 0 | 0,0 | 1 | 1,3 | 0 | 0,0 | 1 | 0,5 | 0,634 |

* chi² Pearson's test

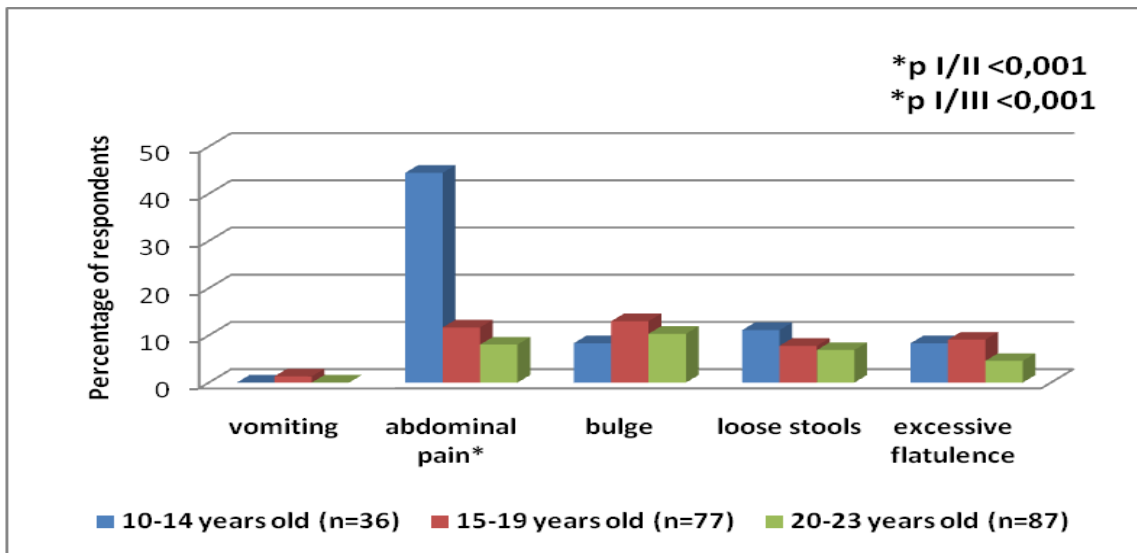


Figure 1 The frequency and type of adverse reactions occurring after ingestion of milk and dairy products in the assessment of the respondents - a comparison of age groups

In the group of 37 people symptoms occurred during the first hour after ingestion, in 9 people and later in 3 (75% vs

18% vs 6%; p = 0.001) (Fig. 2). The time of occurrence of symptoms has been independent of age (p < 0.001).

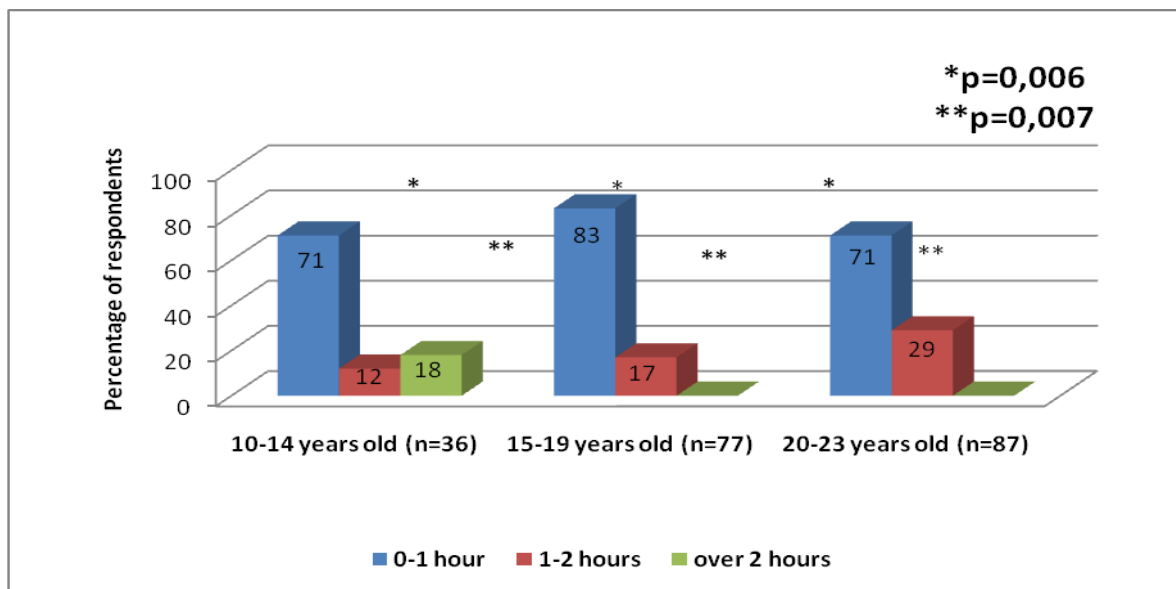


Figure 2. Time of occurrence of intolerance of milk and dairy products depending on the age of studied group - assessment of the respondents

Hypolactosis has been diagnosed in 48 people. Only ten of them (21%) reported before the HBT test that they have adverse reactions after consuming milk and milk products,

including 1 child (25%), 5 patients within a group of young people (29%) and four students (15%) (tab. 2).

Table 2. Comparison of the frequency of reporting adverse reactions after consuming milk and its products, depending on the age and the occurrence of hypolactosis

| Hypolactosis | | | | | | |
|--------------|---|----------|------|----------|------|---------|
| Age | Undesirable reactions after consuming milk and dairy products | No n=152 | | Yes n=48 | | Summed |
| | | N | % | n | % | n |
| 10-14 | Occur | 16 | 94,1 | 1 | 5,9 | 17 |
| | Do not occur | 16 | 84,2 | 3 | 15,8 | 19 |
| | Summed | 32 | | 4 | | 36 |
| | Chi ² Pearson's Test | 0,89 | | df=1 | | p=0,345 |
| 15-19 | Occur | 13 | 72,2 | 5 | 27,8 | 18 |
| | Do not occur | 47 | 79,7 | 12 | 20,3 | 59 |
| | Summed | 60 | | 17 | | 77 |
| | Chi ² Pearson's Test | 0,44 | | df=1 | | p=0,505 |
| 20-23 | Occur | 10 | 71,4 | 4 | 28,6 | 14 |
| | Do not occur | 50 | 68,5 | 23 | 31,5 | 73 |
| | Summed | 60 | | 27 | | 87 |
| | Chi ² Pearson's Test | 0,05 | | df=1 | | p=0,827 |

The occurrence of adverse reactions after consuming milk and dairy products in the survey has been reported by 49 respondents (24%), 39 people without hypolactosis (80%) and 10 with hypolactosis (20%) (ns); in the age groups respectively 94% and 6% of children (ns) 72% and 28% of

adolescents (ns) and 71% and 29% of students (ns) (Tab. 2). It has been found that in the survey significantly more adverse reactions after consuming milk and dairy products have been reported by people without hypolactosis (Tab. 2, Fig. 3).

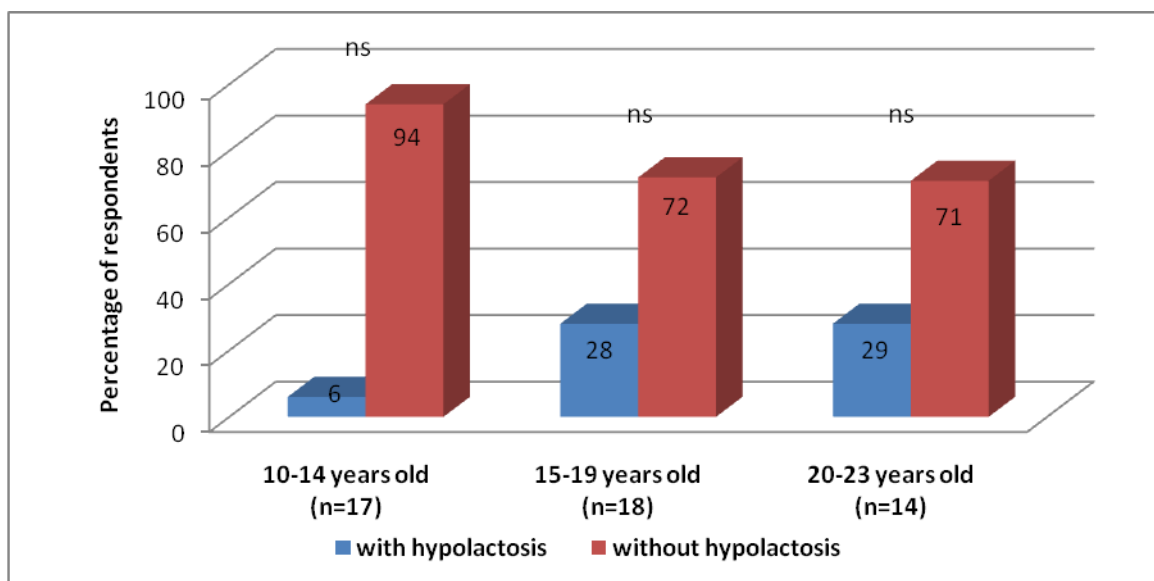


Figure 3: Frequency of HBT measured hypolactosis among patients reporting in the survey intolerance to milk and dairy products

There have been no statistically significant differences in the frequency and type of adverse reactions after consuming milk and dairy products, depending on the occurrence of hypolactosis (Fig. 4). Children aged 10 - 14 years, with

hypolactosis reported in the survey, only the presence of abdominal pain, and those without the presence of hypolactosis: abdominal pain, bloating, excessive flatulence and loose stools (Fig. 5).

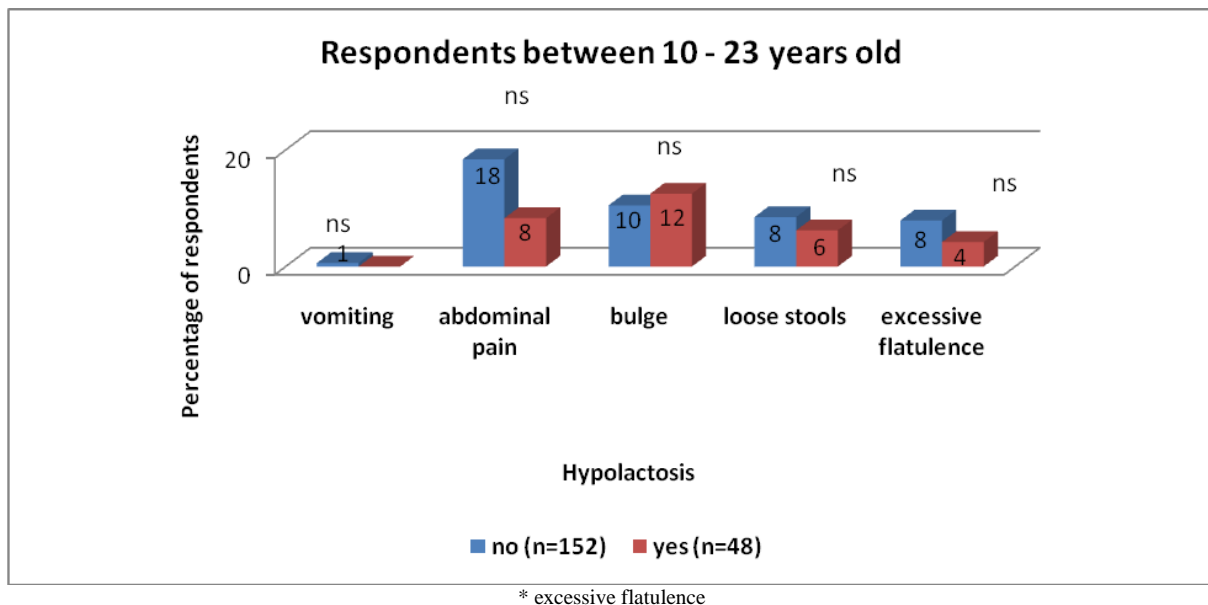


Figure 4. Types of adverse reactions listed in the survey as occurring in the test after the ingestion of milk and dairy products, depending on the occurrence of hypolactosis

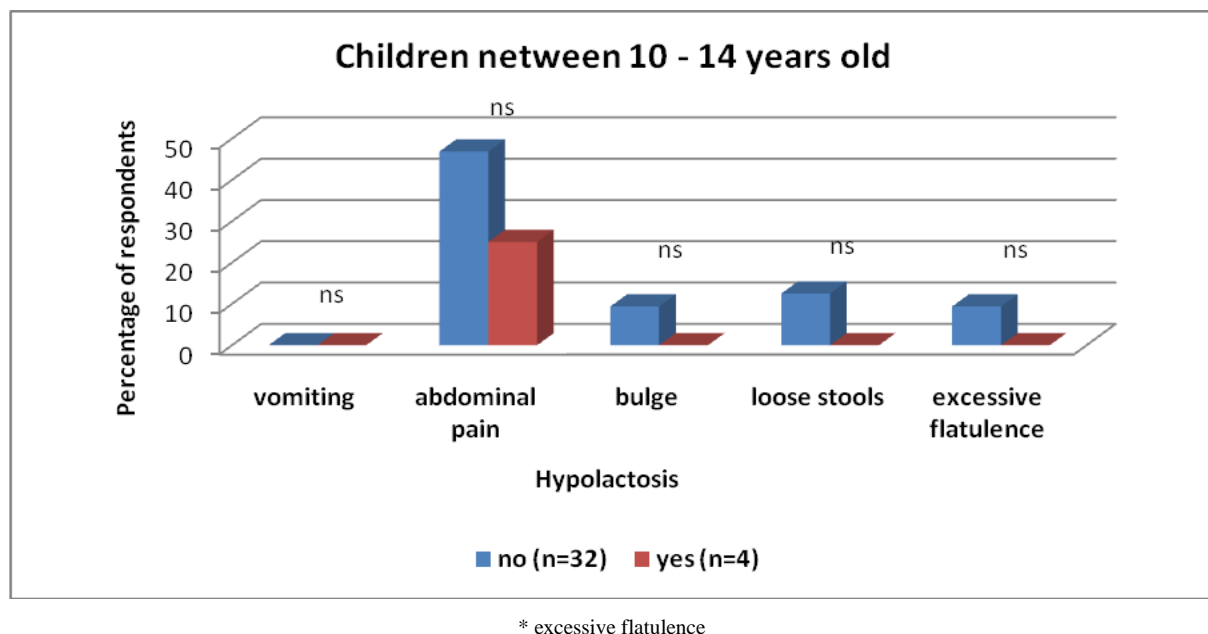


Figure 5. Types of adverse reactions listed in the survey as occurring among children in the test after the ingestion of milk and dairy products, depending on the occurrence of hypolactosis

DISCUSSION

In the studied group of people hypolactosis has been diagnosed in 48 people. Only 10 of them (21%) reported earlier that they have no problems after consuming milk and dairy products: 1 child (25% with hypolactosis), 5 people from a group of young people (29% with hypolactosis) and 4 students (15% with hypolactosis). Thus, only every fifth person with hypolactosis believes that they have intestinal symptoms after consuming milk and its products. Meanwhile, according to our research, they occur more frequently - in 47% of adolescents and 85% of students with hypolactosis. There have been no problems in children with hypolactosis, the amount of them in the study group has been very low - 4 people.

Intolerances of milk and dairy products have been reported by 49 patients (24%). It has been every fourth tested person

aged 10 - 23 years. Most of them - 80% have not had hypolactosis. Hypolactosis has been diagnosed in only 6% of children reporting adverse reactions after consuming milk, 28% of adolescents and 29% of students. Thus, with age decreased the percentage of people who do not have hypolactosis although who believed that they have adverse reactions after consuming milk. Similar observations have been presented by other researchers [12, 13, 14]. Survey shows that people commonly combined the ingestion of lactose with intestinal ailments, including mainly the occurrence of abdominal pain, even in the absence of evident hypolactosis data (negative HBT test) [15, 16, 17, 18, 19]. Symptoms often regarded as NL are secondary to motor disorders of the gastrointestinal tract [15, 20, 21, 22, 23, 24]. Presence of other diseases of the gastrointestinal tract can not be excluded [25, 26, 27].

In the study group of people during the HBT regardless of the presence or not of hypolactosis, abdominal pain and bloating have been reported with the same frequency (9% and 10%). In a survey filled before the HBT test respondents noted higher incidence of abdominal pain than flatulence (16% vs 11%).

During the test of the HBT people with hypolactosis reported abdominal pain and bloating (35% and 33%), with the same frequency. Similarly those without hypolactosis (1% and 3%).

Comparison of the symptoms reported in the questionnaire before the test of the HBT, has shown that people without hypolactosis with the same frequency as those with hypolactosis believe the occurrence of adverse reactions after consuming milk and dairy products (26% vs 21%). Each of intestinal complaints, excluding bloating, has been reported by people without hypolactosis more frequently: abdominal pain (18% vs 8%; ns), diarrhea (8% vs 6%; ns), excessive flatulence (8% vs 4%; ns). Only bloating has been more often reported by people with hypolactosis (12% vs 10%; ns).

In the diagnostics of bloating's causes as the predominant symptom of the intestinal tract, in addition to motor disorders of the gastrointestinal tract: allergy, overgrowth of the intestinal fructose, intolerance and lamblia, one should also consider the diet. An important cause of intestinal gases can be legumes that contain two indigestible sugars, raffinose and stachyose [26, 28].

CONCLUSIONS

1. In the study group, every fourth person aged 10 - 23 years, believed that the consumption of milk and its products, most commonly during the first hour of the meal, induces adverse reactions in the form of abdominal pain, bloating, excessive flatulence, loose stools or vomiting. The percentage of people who had this belief diminish with age.
2. Most people believing that consumption of milk and its products triggers their intestinal adverse reactions had no discomfort after consuming lactose, therefore they have not got hypolactosis. At the same time only every fifth person with hypolactosis thought that they had intestinal symptoms after consuming milk and its products. Meanwhile among adolescents and students with hypolactosis it has been found 2 - 3 times more often.

LITERATURE

- [1]. Haug A, Hostmark AT, Harstad OM. Bovine milk human nutrition - a review. *Lipids Health Dis.* 2007, 6: 25
- [2]. Campmans-Kuijpers MJ, Singh-Povel C, Steijns J, Beulens JW. The association of dairy intake of children and adolescents with different food and nutrient intakes in the Netherlands. *BMC Pediatr.* 2016, 16(1): 2
- [3]. Huth PJ, DiRienzo DB, Miller GD. Major scientific advances with dairy foods in nutrition and health. *J Dairy Sci.* 2006, 89: 1207 – 1221
- [4]. Corgeau M, Scher J, Ritie-Pertusa L, Le DT, Petit J, Nikolova Y, Banon S, Gaiani C. Recent advances on lactose intolerance: tolerance thresholds and currently available solutions. *Crit Rev Food Sci Nutr* 2015
- [5]. Domagała B. Wapń budulec organizmu. *Świat Farm.* 2008, 10: 59 – 60
- [6]. Jabłoński E. Mleczne produkty – źródło wapnia dla młodego organizmu. *Wychow Fiz Zdr.* 2002, 3: 16 – 18
- [7]. Yu YH, Farmer A, Mager DR, Willows ND. Dairy foods are an important source of calcium and vitamin D among Canadian-born and Asian-born Chinese in Edmonton Alberta. *Nutr Res.* 2012, 3: 177 – 184
- [8]. Buzas GM. Lactose intolerance: past and present. Part. II. *Orv Hetil.* 2015, 156: 1741-1749
- [9]. Woś H, Sobol G. Najczęstsze niedobory mineralno – witaminowe u niemowląt i dzieci. *Lekarz* 2006, 5: 34 – 39
- [10]. Esterle L, Sabatier JP, Guillon-Metz F, Walrant-Debray O, Guaydier-Souquieres G, Jehan F, Garabedian M. Milk, rather than other foods, is associated with vertebral bone mass and circulating IGF-1 in female adolescents. *Osteoporos Int.* 2009, 4: 567 – 575
- [11]. Gacek M. Dietary habits and locus of control assessed in middle-school pupils from the Malopolska region of Poland. *Rocz Panstw Zakl Hig.* 2013, 64: 129-134
- [12]. Jellema P, Schellevis FG, Windt DA, Kneepkens CM, Horst HE. Lactose malabsorption and intolerance: a systematic review on the diagnosis value of gastrointestinal symptoms and self-reported milk intolerance. *QJM* 2010, 103: 555 – 572
- [13]. Savaiano DA, Boushey CJ, McCabe GP. Lactose intolerance symptoms assessed by meta-analysis: a grain of truth that leads to exaggeration, *J Nutr.* 2006, 136: 1107 – 1113
- [14]. Brown-Riggs C. Nutrition and Health Disparities: The role of dairy in improving minority health outcomes. *Int J Environ Res Public Health.* 2015, 13(1)
- [15]. Casellas F, Aparici A, Casaus M, Rodriguez P, Malagelada JR. Subjective perception of lactose intolerance does not always indicate lactose malabsorption. *Clin Gastroenterol Hepatol.* 2010, 8: 581 – 586
- [16]. Casellas F, Varela E, Aparici A, Casaus M, Rodriguez P. Development, validation and applicability of a symptoms questionnaire for lactose malabsorption screening. *Dig Dis Sci.* 2009, 54: 1059 – 1065
- [17]. Colloca L, Miller FG. The nocebo effect and its relevance for clinical practice. *Psychosom Med.* 2011, 73: 598 – 603
- [18]. Vernia P, Di Camillo M, Foglietta T, Avallone VE, De Carolis A. Diagnosis of lactose intolerance and the „nocebo” effect: The role of negative expectations. *Dig Liv Dis.* 2010, 42: 616 – 619
- [19]. Yantcheva B, Golley S, Topping D, Mohr P. Food avoidance in an Australian adult population sample: the case of dairy products. *Public Health Nutr.* 2015, 1-8
- [20]. Erminia R, Ilaria B, Tiziana M, Silvia P, Antonio N, Pierpaolo D, Loris B. HRQoL questionnaire evaluation in lactose intolerant patients with adverse reactions to foods. *Inter Emergency Med.* 2011, 26: 1 – 4

- [21]. Malagelada JR. Lactose intolerance. *N Engl J Med*. 1995, 333: 53 – 54
- [22]. Suarez FL, Savaiano D, Arbisi P, Levitt MD. Tolerance to the daily ingestion of two cups of milk by individuals claiming lactose intolerance. *Am J Clin*. 1997, 65: 1502 – 1506
- [23]. Vesa TH, Korpela RA, Sahi T. Tolerance to small amounts of lactose. *Am J Clin Nutr*. 1996, 64: 197 – 201
- [24]. Deng Y, Misselwitz B, Dai N, Fox M. Lactose intolerance in adults: biological mechanism and dietary management. *Nutrients*. 2015, 7: 8020-8035
- [25]. Novillo A, Peralta D, Dima G, Besasso H, Soifer L. Frequency of bacterial overgrowth in patients with clinical lactose intolerance. *Acta Gastroenterol Latinoam*. 2010, 40: 221 – 224
- [26]. Suchy FJ, Brannon PM, Carpenter TO, Fernandez JR, Gilsanz V, Gould JB, Hall K, Hui SL, Lupton J, Mennella J, Miller NJ, Osganian SK, Sellmeyer DE, Wolf MA. National Institutes of Health Consensus Development Conference: Lactose intolerance and Health free. *Ann Intern Med*. 2010, 152: 792 – 796
- [27]. Pal S, Woodford K, Kukuljan S, Ho S. Milk intolerance, beta-casein and lactose. *Nutrients*. 2015, 7: 7285-7297
- [28]. Suarez FL, Levitt MD. An under standing of excessive intestinal gas. *Cur Gastroenterol Rep*. 2000, 2: 413 – 419.