

ASSESSMENT OF PREFERENCES AND FREQUENCY OF MILK AND SELECTED DAIRY PRODUCTS CONSUMPTION BY MOTHERS AND THEIR CHILDREN AGED 1 TO 3 YEARS

Aleksandra Kołota-Burdzy¹, Edyta Krawczuk, Anna Harton¹

Institute of Human Nutrition Sciences, Warsaw University of Life Sciences – SGGW, Poland

ABSTRACT

Background. Early childhood is a time of developing eating habits and taste preferences, which is most influenced by the family environment. Milk and dairy products play an important role in the diet of post-infant children, as they provide many nutrients that condition the proper growth and development of the young body.

Objective. Assessment of the preferences for milk and selected dairy products and the frequencies of their consumption by mothers and their children aged 1 to 3 years.

Material and Methods. The study was conducted in 2019 in a group of women (n=94) aged 20-40 years who have a child aged 1-3 years and do not exclude milk and dairy products from their own or their child's diet. The study applied the Computer-Assisted Web Interview (CAWI) method using a survey including food frequency questionnaire (FFQ) developed on the basis of the Dietary Habits and Nutrition Beliefs Questionnaire (KomPAN) for research on dietary views and habits and questions about the preferences of mothers and their children regarding milk and selected dairy products.

Results. Products that were preferred by mothers and children were also consumed significantly more often in both groups ($p \leq 0.05$). Preferences for selected dairy products in the group of mothers and their children were also similar. The most popular products in both groups were: yoghurt, cottage cheese and rennet cheese, with the latter being preferred by significantly more mothers than children ($p < 0.001$). The frequency of consumption of selected dairy products among women and children was similar, namely the most frequently consumed dairy products were: milk, yoghurt and rennet cheese, and the least frequently consumed were buttermilk and kefir.

Conclusions. Considering the achieved results, it seems reasonable to conduct activities encouraging the consumption of fermented milk products, especially kefir and buttermilk, which have many beneficial health properties and which are the least preferred by mothers and their children aged 1-3 years, and therefore the least consumed.

Keywords: nutrition, women, children aged 1-3 years, milk and dairy products, preferences, frequency of consumption

INTRODUCTION

The nutrition of children in early childhood is of great importance due to the possible risk of nutritional deficiencies and excesses, or nutritional disorders that contribute to the development of various diseases, e.g. obesity, and in later years of life also type 2 diabetes and cardiovascular diseases [1]. A balanced diet of children in this period plays an important role, with particular attention paid to the appropriate energy and nutritional value of the diet [2], the appropriate number of meals and the share of different product groups in them [3]. One of such groups is milk and dairy products, such as: yoghurts, kefirs, buttermilk, cottage cheese and rennet cheese. They are a source of high-quality protein, many minerals: calcium, phosphorus, magnesium, zinc, iodine, potassium, as well as

vitamins: A, D, B₂ and B₁₂. Milk and dairy products should be present in the daily diet of small children [3]. Insufficient calcium and vitamin D intake during childhood can lead to bone mineralization disorders, increase the risk of fractures and rickets, and prevent the achievement of maximum peak bone mass later in life. It also disrupts the functioning of many systems: muscular, nervous, immune, increasing the risk of developing autoimmune diseases [4, 5, 6].

In the case of protein, both deficiency and excess of this ingredient in the diet of small children can be harmful to health, because too little protein intake leads to growth and development disorders, while excessive protein intake increases the risk of overweight and obesity [7]. The way children are fed in the first three years of life, and especially in the post-infancy period, is also of great importance in

Corresponding author: Aleksandra Kołota-Burdzy, Institute of Human Nutrition Sciences, Warsaw University of Life Sciences – SGGW, Nowoursynowska Str. 159C, 02-776 Warsaw, Poland; e-mail: aleksandra_kolota@sggw.edu.pl

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shaping their proper eating habits, which is mainly influenced by parents and their eating habits [8]. Nutritional preferences developed in the first years of a child's life, both favorable and unfavorable ones, tend to persist in the future, also affecting the way they eat, and thus their health in adulthood [9]. Considering the role of the family environment in shaping nutritional behaviors and the importance of milk and dairy products in the development of a small child's body, as well as the relatively small number of Polish studies in this area, such an assessment was undertaken in the present study. The aim of this study was to assess the preferences for milk and dairy products and the frequencies of their consumption by mothers and their children aged 1 to 3 years.

MATERIAL AND METHODS

This study was conducted from January to March 2019 using the CAWI method, using an anonymous Google form survey, the link to which was distributed among mothers of children aged 1 to 3 years by placing it on selected social networking sites and internet forums intended for parents. The method of recruiting participants to the study was the snowball method (non-random sampling) [10]. The criteria for inclusion in the study were: women's age over 18 years, having a child aged 1 to 3 years, no diseases and food allergies/intolerances to cow's milk proteins in the respondent and/or the child, following a standard diet without excluding milk and dairy products from their own and/or the child's diet. The exclusion criteria for the study were having more than one child aged 1-3 years in order to exclude the influence of siblings on the child's preferences and to make it easier for the mother to determine the child's preferences, which could be problematic with a larger number of children, as well as using a dairy-free elimination diet. The study involved 94 women with an average age of 29.6 ± 4.4 years. The research tool was a FFQ containing questions about the frequency of milk and dairy product consumption by mothers and their children, developed on the basis of the KomPAN questionnaire for research on dietary views and habits [11], which was expanded to include questions about milk and selected dairy product preferences (kefir, buttermilk, yoghurt, cottage cheese and rennet cheese). Mothers determined their preferences and the preferences of their children by selecting one of three response categories: "I like it very much", "I like it" and "I don't like it". The survey metrics included questions about: age, education, place of residence and self-assessment of physical activity level, including high, medium and low levels based on recommendations on physical activity for adults (aged 18-64) [12]. High/medium level was defined as more/less than 2.5 hours of moderate intensity activity per

week, e.g. brisk walking, swimming or gardening or more/less than 1.25 hours of high intensity activity, e.g. aerobics, running, fast cycling, while low level was defined as no physical activity or occasional physical activity, e.g. sometimes short walk. The metrics also included questions about anthropometric data of women and their children, such as body weight and height. On this basis, the nutritional status of mothers and children was assessed using the Body Mass Index (BMI). The following criteria for mothers' BMI were used: underweight: less than 18.5 kg/m^2 ; normal body weight: $18.5\text{-}24.9 \text{ kg/m}^2$; overweight: $25.0\text{-}29.9 \text{ kg/m}^2$ and obesity $\geq 30.0 \text{ kg/m}^2$ [13]. The BMI values calculated for children were referred to the percentile charts [14] and the following criteria for assessing nutritional status were adopted: underweight: below the 5th percentile; normal body weight: 5th-85th percentile; overweight: 85th-95th percentile and obesity above the 95th percentile [15].

Statistical analysis was performed using Statistica 13.3 software (TIBCO Software Inc., Palo Alto, California, USA). Pearson's χ^2 test was applied to determine statistically significant differences, and results for which $p \leq 0.05$ were considered statistically significant. Due to the small size of the study group ($n=94$) and as many as 5 possible answers regarding the frequency of consumption in the KomPAN questionnaire, 3 categories were created for the statistical analysis of the results: "1-3 times a month or less often" (originally including the categories: never and 1-3 times a month), "from 1 to several times a week" (including the categories: 1 time a week and several times a week), "from 1 to several times a day" (including the categories: 1 time a day and several times a day).

RESULTS

The characteristics of the study group of women and their children are presented in Table 1. More than half of the women participating in the study were aged 25-34, declared higher education and lived in cities with 20,000 to over 100,000 inhabitants, and were characterized by normal body weight and low level of physical activity. More than half of the group of children were girls, children aged 1 to 2 years, characterized by normal body weight.

Table 2 presents the frequencies of milk and selected dairy products consumption by mothers and children. The frequencies of milk and selected dairy products consumption among women and children was similar, the most frequently consumed dairy products were milk, yoghurt and rennet cheese, and the least frequently buttermilk and kefir. Daily milk consumption was declared by almost half of women and children, yoghurts and cheeses were consumed

Table 1. Characteristics of the study group of women and their children

Characteristics of women		% of respondents
Age*	20-24 years	13
	25-29 years	36
	30-34 years	38
	35-39 years	11
	40-44 years	2
Education	Elementary/vocational	0
	Secondary	29
	Higher	71
Place of residence	Village	11
	City <20k inhabitants	18
	City 20-100k inhabitants	25
	City >100k inhabitants	46
BMI	Underweight	10
	Normal body weight	65
	Overweight	20
	Obesity	5
Self-assessment of physical activity	Low level	59
	Medium level	35
	High level	6
Characteristics of children		% of children
Age	12-24 months	71
	25-36 months	29
Sex	Girl	51
	Boy	49
BMI	Underweight	15
	Normal body weight	76
	Overweight	5
	Obesity	4

* Age categories based on the WHO classification [16]; BMI – body mass index (assessment criteria described in the methodology)

most often from one to several times a week, with over half of women and children consuming yoghurts and cottage cheese from one to several times a week, and in the case of rennet cheese, such frequency of consumption concerned almost 60% of women and half of children. The largest percentage of women and children (over $\frac{3}{4}$ of the group) consumed kefir and buttermilk the least frequently, namely 1-3 times a month or less.

Table 3 presents the preferences for milk and selected dairy products in the group of mothers and children. The most preferred products in both the group of mothers and children were: yoghurt, milk, cottage cheese and rennet cheese. In both groups, preferences were similar, but it was shown that significantly more mothers than children preferred rennet cheese ($p=0.0001$). In addition, a larger percentage of women declared that they liked kefir but did not like buttermilk, and in the group of children, preferences

Table 2. Frequency of consumption of milk and selected dairy products by mothers and children

Product	Frequency of consumption		
	1-3 times a month or less	from 1 to several times a week	from 1 to several times a day
	Mothers (%)		
Milk	25	29	46
Kefir	80	19	1
Buttermilk	88	12	0
Yoghurt	25	64	11
Cottage cheese	44	53	3
Rennet cheese	21	59	20
	Children (%)		
Milk	29	24	47
Kefir	83	16	1
Buttermilk	88	12	0
Yoghurt	20	53	27
Cottage cheese	42	52	6
Rennet cheese	38	48	14

Table 3. Preferences for milk and selected dairy products in the group of mothers and children

Product	Preferences	Mothers (%)	Children (%)	p*
Milk	likes it very much	18	21	NS
	likes it	65	63	
	doesn't like it	17	16	
Kefir	likes it very much	12	6	NS
	likes it	48	41	
	doesn't like it	40	53	
Buttermilk	likes it very much	12	4	NS
	likes it	40	39	
	doesn't like it	48	57	
Yoghurt	likes it very much	28	33	NS
	likes it	69	63	
	doesn't like it	3	4	
Cottage cheese	likes it very much	23	15	NS
	likes it	68	69	
	doesn't like it	9	16	
Rennet cheese	likes it very much	32	18	0.0001
	likes it	67	61	
	doesn't like it	1	21	

*Pearson Chi^2 test; NS – statistically insignificant, $p>0.05$

for both products were similar, more than half of the children did not like both kefir and buttermilk.

Table 4 presents the preferences of children for milk and selected dairy products depending on the preferences of mothers. Statistical analysis showed that children of mothers who declared that they liked milk, yoghurt, cottage cheese and rennet cheese also preferred these products ($p < 0.001$). On the other hand, children of mothers who declared that they did not like kefir and buttermilk did not prefer these products either ($p = 0.0000$).

Table 5 presents the frequency of consumption of milk and selected dairy products by children depending on their preferences. Statistical analysis showed that those dairy products that were preferred by children were also consumed more often by them.

Table 4. Preferences for milk and selected dairy products in children depending on mothers' preferences

Product	Mothers' preferences	Children's preferences (%)			p*
		likes it very much	likes	doesn't like it	
Milk	likes it very much	12	6	0	0.0000
	likes it	9	49	7	
	doesn't like it	1	7	9	
Kefir	likes it very much	6	1	4	0.0000
	likes it	0	28	20	
	doesn't like it	0	12	29	
Buttermilk	likes it very much	4	5	2	0.0000
	likes it	0	25	16	
	doesn't like it	0	10	38	
Yoghurt	likes it very much	24	4	0	0.0000
	likes it	10	56	3	
	doesn't like it	0	2	1	
Cottage cheese	likes it very much	11	11	2	0.0002
	likes it	3	52	13	
	doesn't like it	1	6	1	
Rennet cheese	likes it very much	14	12	6	0.0000
	likes it	3	49	15	
	doesn't like it	1	0	0	

*Pearson χ^2 test

A significantly higher percentage of children who preferred milk consumed it every day ($p = 0.0007$), while yoghurt and both types of cheese from one to several times a week, compared to children who did not like these products. At the same time, more than half of children who did not like buttermilk and kefir consumed these products 1-3 times a month or less often. It is worth noting that about 30% of children, despite liking these products, consumed them rarely.

Table 6 presents the frequencies of milk and selected dairy products consumed by mothers depending on

Table 5. Frequency of milk and selected dairy products consumption by children and their preferences

Children's preferences	Frequency of food consumption by children (%)			p*
	1-3 times a month or less	from 1 to several times a week	from 1 to several times a day	
Milk				
Likes it very much	1	2	18	0.0007
Likes it	20	16	27	
Doesn't like it	8	6	2	
Kefir				
Likes it very much	1	5	0	0.0000
Likes it	29	11	1	
Doesn't like it	53	0	0	
Buttermilk				
Likes it very much	0	4	0	0.0000
Likes it	32	8	0	
Doesn't like it	56	0	0	
Yoghurt				
Likes it very much	0	18	15	0.0004
Likes it	17	34	12	
Doesn't like it	3	1	0	
Cottage cheese				
Likes it very much	1	11	3	0.0000
Likes it	24	42	3	
Doesn't like it	16	0	0	
Rennet cheese				
Likes it very much	0	12	6	0.0000
Likes it	17	36	8	
Doesn't like it	21	0	0	

*Pearson χ^2 test

their preferences. In the group of mothers, it was shown that the preference for milk and some dairy products had a significant impact on the frequency of their consumption. A significantly higher percentage of mothers who preferred milk consumed it from one to several times a day ($p=0.0003$), yoghurt and cottage cheese from one to several times a day ($p=0.0007$ and $p=0.0081$, respectively) than mothers who did not prefer these products. In turn, significantly more women who declared that they did not like buttermilk and kefir consumed these products from one to three

times a month or less often (in both cases $p=0.0000$) than women who rated these products as liked. It should be noted that about 1/3 of women, although they declared that they preferred products such as cottage cheese, kefir or buttermilk, consumed them with the lowest frequency.

Table 7 presents the frequency of milk and selected dairy products consumed by children depending on their mothers' preferences. It was shown that mothers' preferences for milk and selected dairy products had a significant impact on the frequency of consumption

Table 6. Frequency of milk and selected dairy product consumption by mothers and their preferences

Mothers' preferences	Frequency of product consumption by mothers (%)			p*
	1-3 times a month or less	from 1 to several times a week	from 1 to several times a day	
Milk				
Likes it very much	0	4	14	0.0003
Likes it	15	20	30	
Doesn't like it	11	4	2	
Kefir				
Likes it very much	4	8	0	0.0000
Likes it	35	12	1	
Doesn't like it	40	0	0	
Buttermilk				
Likes it very much	6	5	0	0.0000
Likes it	34	7	0	
Doesn't like it	48	0	0	
Yoghurt				
Likes it very much	0	24	4	0.0007
Likes it	22	41	6	
Doesn't like it	3	0	0	
Cottage cheese				
Likes it very much	2	19	2	0.0081
Likes it	33	34	1	
Doesn't like it	5	3	1	
Rennet cheese				
Likes it very much	1	11	6	NS
Likes it	14	35	12	
Doesn't like it	6	13	2	

*Pearson χ^2 test; NS – statistically insignificant, $p>0.05$

Table 7. Frequency of consumption of selected milk and dairy products by children and mothers' preferences

Mothers' preferences	Frequency of food consumption by children (%)			p*
	1-3 times a month or less	from 1 to several times a week	from 1 to several times a day	
Milk				
Likes it very much	2	3	13	NS
Likes it	21	18	25	
Doesn't like it	5	3	9	
Kefir				
Likes it very much	7	5	0	0.0388
Likes	39	8	1	
Doesn't like it	37	3	0	
Buttermilk				
Likes it very much	5	7	0	0.0001
Likes	36	4	0	
Doesn't like it	46	2	0	
Yoghurt				
Likes it very much	0	15	13	0.0039
Likes it	18	37	14	
Doesn't like it	2	1	0	
Cottage cheese				
Likes it very much	4	17	2	NS
Likes it	33	32	3	
Doesn't like it	4	3	1	
Rennet cheese				
Likes it very much	9	16	7	0.0216
Likes it	30	32	5	
Doesn't like it	0	0	1	

*Pearson χ^2 test; NS – statistically insignificant, $p>0.05$

of these products by children. A significantly higher percentage of children of mothers who declared that they preferred yoghurt or rennet cheese consumed these products from one to several times a week ($p=0.0039$ and $p=0.0216$, respectively) than children of mothers who did not prefer these products. Moreover, significantly more children of mothers who did not like buttermilk consumed this product less often than children of women who preferred this product ($p=0.0001$). The case was different for kefir, because significantly more children of mothers who liked kefir consumed it less often, compared to children of mothers who declared that they did not like this product ($p=0.0388$).

DISCUSSION

The way of feeding in early childhood is crucial for the proper growth and development of a young organism. In recent years, the problem of the growing percentage of smaller and smaller children with excessive body weight has been emphasized; according to WHO data, in Europe the incidence of overweight and obesity in children under 5 years of age ranges from 1 to 29% [17]. In our study, 76% of children were characterized by normal body weight, which is consistent with the results of other Polish studies, namely 71% of the examined children aged 1-3 years from the Wielkopolska region were also characterized by normal body weight [18], similarly 68% of children aged 1-3 years in the Pitnuts 2016 study conducted by Weker et al. [19]. In our own study, excess body weight was found in less than 10% of children, also 10% of children with excess body weight were found in the Pitnuts 2016 study [19], while in the Wojtyła-Buciora study [18] it was 13%. Additionally, it is worth noting that in our study 15% of children were characterized by too low body weight, the same percentage of underweight children was found in the Wielkopolska region [18], while in the Pitnuts 2016 study, too low body weight was found in less than 5% of children [19]. The discrepancies are most likely related to different approaches to the criteria for classifying the nutritional status of small children, as well as the different numbers of the studied groups, including the fact that the Pitnuts study was conducted in a representative group of children, while in this study the studied group was not representative.

Milk and dairy products should be an important part of the diet of small children, as they provide many nutrients that are necessary for the proper growth and development of a young organism. In this study, most children consumed milk and selected dairy products once or several times a day, which corresponds to the results obtained in a study conducted among children aged 2 and 3 from rural areas [20]. On the other hand,

the most frequently consumed dairy products in the group of children were milk, yoghurt and rennet cheese, and the least frequently buttermilk and kefir. Similarly, children aged 1-3 from the Wielkopolska region also most frequently consumed milk, yoghurt and cheese, and only 1% consumed buttermilk or kefir [18]. Our own results and those of other authors indicate a very small share of fermented milk products such as buttermilk and kefir in the diet of children, which in this study were consumed by over 80% of children 1-3 times a month or less, while less than 30% of children consumed yoghurt from one to several times a day, which means that these children fulfilled the recommendations that one of the two portions of milk products daily should be fermented milk products [3]. Also, the mothers' declarations regarding the frequency of consumption of fermented products indicate the problem of their too low consumption in this group, while the frequency of consumption of selected dairy products was similar to the consumption of these products in the group of children. Less than half of the respondents declared that they consumed milk from one to several times a day, which does not differ significantly from the results of other studies conducted among young adults, as almost 40% of female students of Wrocław universities consumed milk at least once a day, and every sixth of them declared consumption several times a day [21]. Other Polish studies also showed that students most often consume milk, followed by yoghurt and ripened cheese [22, 23].

Not only the frequency of consuming dairy products, but also the preferences for selected dairy products were similar in both the group of mothers and children. Women declared that they preferred yoghurts, cheeses and milk the most, and buttermilk the least, similarly in other Polish studies it was noted that in the group of young women the most liked dairy products were yoghurts and rennet cheese, and the least buttermilk [24]. In the group of Poznań female students the most preferred dairy products were cottage cheese and maturing cheese, fermented drinks and milk, and the least kefir, buttermilk, smoked cheeses and flavoured cottage cheeses [25]. Also in the group of students the most preferred were yoghurts and rennet cheeses [23]. On the other hand, among foreign consumers the most preferred were yoghurts, milk and cheeses [26]. Interestingly, yoghurt is indicated as the most liked product by teenagers [27], as well as children from younger classes [28]. Children aged 1-3 years participating in this study, in the opinion of their mothers, preferred cottage cheese, yoghurt and milk the most, and kefir and buttermilk the least. In the available scientific literature, there is a lack of studies on the preferences of milk products among small children, however, other authors indicate that kefir

and buttermilk are among the least preferred milk products in different age groups, both in preschool children [29], adolescents [27], and adults [24].

One of the most important factors influencing food choice is taste [30], and dairy products are also consumed for their taste [31]. Among them, yoghurt is the product most accepted by consumers due to not only its taste, but also its nutritional value and health-promoting properties [31]. Although our study did not ask about product features that influence preferences or purchasing decisions, the study conducted by Świąder et al. [23] indicates that for young adults, the important features when choosing a product are: composition, consistency, appearance and taste. A different production method causes kefir to have a specific, slightly fermented and sour taste, which is caused by volatile compounds produced by microorganisms present in kefir grains [32]. It can be assumed that the slightly sour taste of kefir makes this product less acceptable than other milk products, e.g. yoghurt. Additionally, yoghurt can be used as an ingredient in various meals and dishes, while kefir as an ingredient in various dishes seems to be much less common. However, considering that kefir is a probiotic product with a broad spectrum of health-promoting effects, including antibacterial and immunomodulatory effects, as well as improving lactose digestion [33], its inclusion in the daily diet of small children is very important and for this reason it seems justified to conduct nutritional education among parents.

In our own study, it was noted that selected dairy products preferred by mothers were similarly preferred by their children, which confirms the important role of the family environment in shaping children's taste preferences [34]. In the case of the smallest children, parents are fully responsible for their diet, having a direct influence on the composition of the child's daily diet, but additionally they can also influence children's eating behaviours by modelling them [9]. In the available Polish literature, there is a lack of studies on dairy product preferences among children aged 1 to 3 years, while a study conducted in a group of preschool children and their mothers showed that there is a relationship between mothers' taste preferences and their children's preferences for selected dairy products, although this concerned a greater preference for sweet dairy products compared to natural products [29]. In turn, Japanese researchers showed a relationship between mothers' nutritional preferences and the nutritional preferences of children aged 3 to 5 years, but in relation to food in general [35]. Interestingly, they demonstrated a relationship between mothers' preferences from their childhood and current dietary habits and the dietary habits of their children, assuming that the dietary preferences of

mothers may be inherited by children. The researchers suggested that children's dietary preferences can be modified by providing them with a variety of products, regardless of the mothers' likes and dislikes [35]. Considering that parents' dietary practices and their consumption of dairy products may shape the consumption of dairy products in children [34], it would be advisable to provide parents with nutritional education on the health benefits of regular consumption of dairy products, but in parallel with educational activities for preschool children, because this is the time when developing healthy dietary habits will be most effective [36]. Additionally, as indicated by the results of studies conducted among adolescents, the frequency of pro-health dietary behaviours decreases with age [37], which is why nutritional education for preschool children is particularly important.

Limitations of the study

Among the factors limiting the study, it is worth mentioning: the small size of the group (mothers/children), which makes it impossible to generalize the results to the population; the use of the FFQ method in assessing the consumption of milk and dairy products (mothers/children), which may result in overestimating the frequency of consumption by respondents; self-reporting of anthropometric data by mothers (data regarding mothers/children), which is subject to underestimation/overestimation error.

CONCLUSIONS

Taking into account the obtained results, it seems justified to conduct activities encouraging the consumption of fermented milk products, especially kefir and buttermilk, which have many beneficial health properties and which are the least preferred by mothers and their children aged 1-3 years, and therefore the least frequently consumed.

Disclosure conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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