NATURAL NUTRITION VERSUS FORMULA NUTRITION IN CHILDREN AGED 1-23 MONTHS. EPIDEMIOLOGICAL STUDY

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Abstract: *Natural nutrition is essential in the weight and psychomotor development of the infant. Human milk is personalized and reflects the balance between maternal diet, metabolism, transport and secretion of milk and that responds to the infant's growth and development needs. Human milk is a complex and dynamic fluid that offers nutrients, antigens, passive immunity, growth factors and bioactive compounds that can actively form and educate the immune system for infants. Artificial feeding, considered as a well-balanced alternative to natural food, has evolved from a deep understanding of how human milk changes over time. The composition from the infant formulas evolved with the improvement of knowledge about natural nutrition. It is presented a prospective study that evaluates the child aged 1-23 months, depending on the diet (natural, group I or formula, group II) with the objective of outlining a general profile of the two study groups.*

INTRODUCTION

Natural nutrition is the essential element of promoting the health of children: it "hosts" anti-infective defence systems, it prevents autoimmunity, it contributes to digestive system development.(1)

The human milk is considered "unique", without the possibility of being entirely "copied", not even by the most elaborate milk production techniques.

Human milk has a composition that varies depending on nutrition, during breast-feeding, from mother to mother, among populations, diurnal variations that perfectly adapt to the needs of the child.(2,3,4) For example, the milk that is expressed at the beginning is thinner, with a high lactose content, suitable for the hydration of the infant and is creamier during breast-feeding, with a higher fat content.(5)

Studies of human milk samples collected at the beginning and end of breastfeeding showed the following: protein and carbohydrate concentration remained unchanged during lactation. In contrast, the lipid concentration is significantly higher at the end of breastfeeding.(6,7)

Changes in the composition of human milk are buffered by mobilizing maternal nutritional stocks and changing the needs of infants, resulting in personalized human milk that reflects the balance between maternal diet, metabolism, transport and secretion of milk and that responds to the growth of the infant and to the evolution requirements of this one.(8-11)

Having demonstrated the crucial role of natural nutrition in three of the most common morbidity/ comorbidities in paediatric pathology, studies have revealed the following:

protective, anti-infective/ anti-inflammatory role (12) through:

- the relative risk (RR) of the incidence of diarrhea is greatly reduced among infants fed with human milk (RR = 1.5), compared to mixed (RR = 3.2) or artificially fed infants (RR = 3,9);
- the relative risk of mortality because of diarrhea is greatly reduced among infants fed with human milk (RR = 2.4), compared to mixed (RR = 4.8) or artificially fed infants (RR = 10,6);
- the relative risk of the incidence of pneumonia is lower among infants fed with human milk (RR = 1,8),
- compared to mixed (RR = 2,6) or artificially fed infants (RR = 2,0);
- the relative risk of mortality because of pneumonia is much lower among infants fed with human milk (RR = 1.7), compared to mixed (RR = 2.6) or artificially fed infants (RR = 15);

the energy role, to prevent overweight/ obesity (13) through:

- the risk (prevalence at 5 years) of overweight is between 10-12% and the one of obesity between 2-4% for infants who were fed with human milk only in the first 2 months of life;
- the risk (prevalence at 5 years) of overweight is between 8-10% and the one of obesity between 2-4% for infants who were fed with human milk the first 3-5 months of life;
- the risk (prevalence at 5 years) of overweight is between 6-8% and the one of obesity between 0-2% for infants who were fed with human milk the first 6-12 months of life;
- the risk (prevalence at 5 years) of overweight is between 4-6% and the one of obesity between 0-1% for infants who were fed with human milk for more than 12 months.

Studies provide evidence that there is no immunological milk composition produced by healthy women. On the contrary, there are substantial variations within and especially among human subpopulations. However, the data suggest the existence of a common, "base" set of immunoglobulins, cytokines, chemokines and growth factors that are present in mature milk produced by all women, regardless of their origin.(14) Other "variable" components may have a different importance for children's health due to the place, culture, breastfeeding standards etc. Additional studies are needed to elucidate the relationships between the specific variables of the host, the geographical, environmental, lifestyle and health ones, as well as the immune composition of

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colostrum, transitional milk and mature milk.

The technology of milk formulas, from artificial nutrition, considered as a well-balanced alternative to natural nutrition, has evolved from a deep understanding of how human milk changes over time. The composition of infant formulas evolved with the improvement of knowledge about natural nutrition.

As a conclusion, human milk is a complex and dynamic fluid that offers nutrients, antigens, passive immunity, growth factors and bioactive compounds that can actively form and educate the immune system for infants.(15-17)

PURPOSE

The study aims to evaluate the epidemiological data characterizing the child aged 1-23 months, depending on the diet (natural or with formula) and outline a general profile of the child aged 1-23 months, fed with human milk, respectively outlining a general profile of the child aged 1-23 months fed with formula.

MATERIALS AND METHODS

The research is based on a prospective study comprising the first group - children aged between 1-23 months, naturally fed and group II, children aged between 1-23 months, formula-fed, admitted in the Sibiu Paediatrics Clinic, through continuous hospitalization or one-day hospitalization, for a condition not interfering with acute infectious pathology, between January 2016 and December 2017.

A total of 84 subjects were included in the study. Group I comprised 45 subjects (naturally fed) and group II comprised 39 subjects (formula-fed). The age of subjects included in the study varied between 2 months and 23 months.

The following parameters were evaluated:

- the age, respectively the age groups of the subjects;
- gender;
- parity (rank of the child);
- place of origin;
- socio-economic conditions;
- type of nutrition;
- medical history.

RESULTS AND DISCUSSIONS

Group I comprised 45 naturally-fed subjects.

These were evaluated according to the parameters described in the methodology and the results are shown in table no. 1.

Table no. 1. Results of the epidemiological parameters belonging to the first group of study

Study parameter			Number of cases	Percent %
Age group	1-6 months		12	26,67
	7-12 months		12	26,67
	13-23 months		21	46,66
Gender	Male		18	40,00
	Female		27	60,00
Place of origin	Urban		15	33,33
	Rural		30	66,67
Rank of the subject (parity)	First		24	53,33
	Second		9	20,00
	Third and more		12	26,67
Socio-economic conditions	Minimum		3	6,67
	Average		18	40,00
	Good / very good		24	53,33
Medical history	Positive	1 episode	18	40,00
		2 episodes	0	0
		Over 3 episodes	9	20,00
	Negative		18	40,00

It is noted that group I (with natural nutrition) is mainly represented by the age group 13-23 months (46,67%), female gender (60%), rural origin (66,67%), subjects of rank I in their families (53.33%), subjects from families with good and very good social and economic conditions (53.33%), subjects with positive medical history (60 %).

Group II included 39 subjects, formula-fed.

These were evaluated according to the parameters described in the methodology and the results are shown in table no. 2.

Table no. 2. Results of the epidemiological parameters belonging to the second group of study

Study parameter			Number of cases	Percent %
Age group	1-6 months		0	0
	7-12 months		9	23,07
	13-23 months		30	76,93
Gender	Male		18	46,15
	Female		21	53,85
Place of origin	Urban		18	46,15
	Rural		21	53,85
Rank of the subject (parity)	First		30	76,92
	Second		6	15,38
	Third and more		3	7,70
Socio-economic conditions	Minimum		12	30,76
	Average		21	53,85
	Good / very good		6	15,39
Medical history	Positive	1 episode	15	38,46
		2 episodes	6	15,39
		Over 3 episodes	12	30,76
	Negative			15,39

It is noted that group II (formula-fed) is mainly represented by the age group 13-23 months (76.93%), female gender (53.85%), rural origin (53.85%), subjects of rank I in their families (76.92%), subjects from families with average socio-economic conditions (53.85%), subjects with positive medical history (84,61 %).

The studied groups were statistically compared.

Regarding the age group of subjects from the two study groups, it is found that for both groups it predominates the age group of 13-23 months; however, there is a statistically significant difference between the two groups in favour of group II ($p = 0.004$), difference by the specialty literature. For the age group of 1-6 months, the difference between groups is extremely statistically significant ($p = 0.0002$), according to the nutrition guidelines for optimal breastfeeding duration (6 months).

Regarding the rank of the subjects in the family, there is a statistically significant difference ($p = 0.02$), in the sense that in many more families the natural nutrition was continued also in the children of rank 2 or higher.

As regards the socio-economic conditions of the families of the subjects, there is an extremely significant difference between groups ($p = 0002$), the natural nutrition being more frequent in families with good or very good socio-economic conditions. Surprisingly, at least compared to the previous 20 years, the natural nutrition practiced in a family with a good socio-economic level exceeds that of a family with a minimum or medium level.

In relation to the major role of human milk, that of anti-infective/ anti-inflammatory protection, the percentage of

the absence of medical history is significantly higher in group I than in group II (p = 0.012). In contrast, the groups are not statistically different when comparing the frequency of infectious episodes in medical history (p = 0.88, for one infectious episode, respectively 0.255 for more than 3 episodes).

The study groups are homogeneous in terms of gender (p = 0.56) and place of origin (p = 0,23).

CONCLUSIONS

The epidemiological study allowed outlining the following general profile of the child aged between 1-23 months and fed with human milk:

- Natural nutrition is prolonged until the end of the first two years of life and observes the recommendations of the nutrition guidelines, those referring to the optimal duration of 6 months;
- In families where natural nutrition is practiced in a first-rank child, also the children of rank 2 or higher benefit of nutrition with human milk;
- In families with good and very good socio-economic conditions, natural nutrition is promoted more frequently;
- Natural nutrition significantly decreases morbidity through infectious diseases.

The epidemiological study allowed outlining the following general profile of the child aged between 1-23 months and fed with formula:

- Formula nutrition is continued until the end of the first two years of life;
- In families where the first rank child is fed with formula, in a significantly higher percentage, the other high-ranking children will also be fed with formula;
- formula nutrition is practiced in families with average socio-economic level;
- formula-fed children, in a significantly higher percentage, have a personal medical history.

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