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MICROBIOLOGIA BALKANICA 2011

7th BALKAN CONGRESS OF MICROBIOLOGY

8th CONGRESS OF SERBIAN MICROBIOLOGISTS

Serbian Society for Medical Microbiology
Serbian Society for Microbiology
Faculty of Biology, University of Belgrade

October 25-29, 2011

Continental Hotel, Belgrade, SERBIA

CIP – Katalogizacija u publikaciji
Narodna biblioteka Srbije, Beograd

Udruženje mikrobiologa Srbije, Beograd.
Knjiga radova (Elektronski izvor) – Proceedings **/** MICROBIOLOGIA BALKANICA 2011 - 7th BALKAN CONGRESS OF MICROBIOLOGY & 8th CONGRESS OF SERBIAN MICROBIOLOGISTS, 25-29. oktobar 2011; (organizator) Udruženje mikrobiologa Srbije, Udruženje medicinskih mikrobiolga Srbije; (urednici: Dragojlo Obradović, Lazar Ranin, Špiro Radulović) – Beograd
1 elektronski optički disk (CD-ROM); 12cm

Sistemski zahtevi: Nisu navedeni. Nasl. sa naslovnog ekrana. –
Radovi na engleskom jeziku.-
Tekst latinica. –
Tiraž – 600.
Abstracts. – Registar

ISBN 978-86-914897-0-01
Udruženje mikrobiologa Srbije, Beograd.

KNJIGA RADOVA / PROCEEDINGS
MICROBIOLOGIA BALKANICA 2011 - 7th BALKAN CONGRESS OF MICROBIOLOGY & 8th CONGRESS OF SERBIAN MICROBIOLOGISTS, 25-29. oktobar 2011

Izdaje / Published by:
Udruženje mikrobiologa Srbije
Nemanjina 6, 11 080 Beograd, Srbija, tel/fax: 011 2199 711, dobradovic@agrifaculty.bg.ac.rs

Za izdavača / For Publisher:
Dragojlo Obradović, predsednik Udruženja

Urednici/Editors:
Dragojlo Obradović
Lazar Ranin
Špiro Radulović

ISBN 978-86-914897-0-01

Kompjuterska obrada teksta / Computer Layout:
Jelena Zovko Belić

Tiraž / Circulation
600 primeraka / 600 copy

Umnožavanje / Copying
Megaphone d.o.o., Vladimira Rolovića 105, Beograd, Srbija

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EFFECT OF A FOLLOW-ON FORMULA SUPPLEMENTED WITH PREBIOTICS ON THE BABY´S GUT COMPOSITION

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Introduction: The microbial colonization of human intestine begins at birth. Different factors, mainly the type of diet, influence the development of the baby´s gastrointestinal microflora. Human breast milk is the best dietary choice for babies, and considered the gold standard against which the quality of adapted formula milks is assessed.

Aim: The aim of this study was to determine effect of a follow-on formula supplemented with inulin and fructooligosaccharides (FOS) on the gut microbial composition, as well as on the growth and development of babies, and to compare it to that of human breast milk.

Material and methods: Healthy, vaginally, term born babies 6 to 12 months old, were enrolled in 28-day study. Babies were divided in two groups according to the type of feeding: those receiving supplemented follow-on formula with inulin and FOS, and those receiving breast milk (control group). Fecal samples were obtained before (day 0) and during study at days 14 and 28, and used to determine the counts of *Bifidobacterium sp.*, *Lactobacillus sp.*, total aerobes, anaerobes, and yeasts and fungi. Every day during the study, the weight and length of the babies, number of feeds, tolerance to the offered meal (follow-on formula or breast milk), and stool frequency and consistency were recorded.

Results: Before and after 14 days of formula administration, the number of bifidobacteria and lactobacilli did not differ among the groups. At the end of the 28-day period, the number of bifidobacteria and lactobacilli significantly increased in formula fed versus breast milk fed group. There were no significant differences in fecal numbers of total aerobes, anaerobes, and yeasts and fungi. All babies exhibited normal growth during the study, within the normal framework for that period of life (age between 6-12 months), and liked offered milks. Stool frequency and consistency, and side effects (flatus and regurgitations) did not differ among the feeding groups during the study.

Conclusion: This study showed that follow-on formula supplemented with inulin and FOS stimulates bifidogenic effect in the baby´s intestine during the weaning period. It can be concluded that tested follow-on formula with prebiotics has a similar effect on the baby´s gut microflora, and growth development as mature breast milk.

Key words: inulin, follow-on formula, bifidobacteria, lactobacilli

EFFECT OF A FOLLOW-ON FORMULA SUPPLEMENTED WITH PREBIOTICS ON THE BABY´S GUT COMPOSITION

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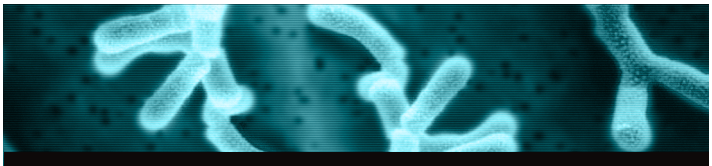
Introduction:
The microbial colonization of human intestine begins at birth. Different factors, including the type of birth (vaginal or caesarean), the microflora of the mother's vagina and skin, hygiene during birth, the newborn's environment, antibiotic regime and, above all, the type of diet, influence the development of the baby´s gastrointestinal microflora. Human breast milk is the best dietary choice for babies, as it protects babies from allergies, infections and oxidative stress. Breast milk is considered the gold standard against which the quality of adapted formula milks is assessed. Formula feeds, used by women who cannot breastfeed, should satisfy all the nutritional requirements and allow normal development of babies.

Aim:
The aim of this study was to determine effect of a follow-on formula supplemented with inulin and fructooligosaccharides (FOS) on the gut microbial composition, as well as on the growth and development of babies, and to compare it to that of human breast milk.

Material and methods:
Healthy, vaginally, term born babies 6 to 12 months old, were enrolled in 28-day study. Babies were divided in two groups according to the type of feeding: those receiving supplemented follow-on formula with inulin and FOS (FF), and those receiving breast milk (BMF, control group). The follow-on formula group received an experimental full-term formula designed for babies 6 to 12 months old, and supplemented with inulin and FOS (4.0 g/l). The inulin and FOS used in this study were produced from natural chicory. Fecal samples were obtained before (D0) and during study at days 14 and 28 (D14, D28), and used to determine the counts of *Bifidobacterium sp., Lactobacillus sp.*, total aerobes, anaerobes, and yeasts and fungi. Every day during the study, the weight and length of the babies, number of feeds, tolerance to the offered meal (follow-on formula or breast milk), and stool frequency and consistency were recorded.

Results:
Modifications in the levels of microbial colonization between the beginning D0, D14 and the end of the supplementation for both groups are compared in table . The bacterial counts are expressed as means ± SD 10^8 CFU/g feces. Before and after 14 days of formula administration, the number of bifidobacteria and lactobacilli did not differ among the groups. At the end of the 28-day period, the number of bifidobacteria and lactobacilli significantly increased in formula fed versus breast milk fed group. Simultaneously with the increase in bifidobacterial and lactobacilli populations, decreases in the total aerobes, anaerobes and yeasts and fungi levels were observed. During the study, the numbers of total aerobes and yeasts and fungi continually decreased in the stools of the FF infants, without statistically significant differences between the groups at the end of the study. The anaerobes decreased in both groups during the study, with significant differences with time but without significantly different rates of change. All babies exhibited normal growth during the study, within the normal framework for that period of life (age between 6-12 months). In the study, all babies in each group liked the offered milks. The intake of the bottle formula with added inulin and FOS at 4.0 g/l was well tolerated by the infants: the incidence of side effects did not differ among the feeding groups during the study. Stool frequency and consistency, and side effects (flatus and regurgitations) did not differ among the feeding groups during the study.

Conclusion:
This study showed that follow-on formula supplemented with inulin and FOS stimulates bifidogenic effect in the baby´s intestine during the weaning period. It can be concluded that tested follow-on formula with prebiotics has a similar effect on the baby´s gut microflora, and growth development as mature breast milk.



LEVELS OF BABY'S GUT COLONIZATION
IN THE FOLLOW-ON FORMULA AND BREASTMILK FED GROUPS

	CFUx 10^8/g of feces in the following group				
Type of feeding	Follow-on formula with added inulin and FOS (FF)	Breastfeeding (BMF)	*p**	*F1***	*F1group***
Bifidobacterium				0.012	0.022
D0	9.86±10.23	9.04±11.97	0.871		
D14	18.68±19.43	20.81±46.75	0.896		
D28	33.57±20.64	9.91±10.48	0.005		
Lactobacillus				0.003	0.022
D0	12.21±12.40	14.95±21.05	0.727		
D14	18.03±21.35	16.60±18.14	0.874		
D28	60.24±30.23	16.79±12.70	0.001		
Aerobes				0.005	0.198
D0	114.34±62.53	67.08±66.21	0.118		
D14	40.80±32.90	37.21±29.25	0.800		
D28	11.97±10.14	34.43±63.23	0.282		
Anaerobes				0.000	0.989
D0	185.95±136.21	205.25±73.42	0.698		
D14	67.81±42.69	78.54±54.68	0.835		
D28	28.59±39.17	45.09±58.14	0.466		
Yeasts and Fungi				0.017	0.292
D0	76.56±105.20	23.94±43.07	0.810		
D14	16.61±16.40	21.08±29.13	0.677		
D28	7.72±10.78	6.70±7.78	0.161		

*The *p* value represents the significance level of the difference in the change between the groups during the study, determined by the independent-sample t-test.
** *F1* and *F1 group* - given as the internal group factor (within subject factors – *F1*) and as the factor of differences between the groups (between subject factors – *F1 group*).