

The Effect of Probiotic *Lactobacillus Reuteri* on Reducing the Period of Restlessness in Infants with Colic

Z. Akbarian Rad (MD)¹, M. Haghshenas Mojaveri (MD)^{*1}, Y. Zahed Pasha (MD)¹,
M. Ahmadpour-kacho (MD)¹, K. Hajian (MD)², Y. Taghipoor ³

1. Non-Communicable Pediatric Diseases Research Center of Amirkola, Babol University of Medical Sciences, Babol, I.R.Iran

2. Department of Statistics, Babol University of Medical Sciences, Babol, I.R.Iran

3. Babol University of Medical Sciences, Babol, I.R.Iran

Received: May 14th 2014, Revised: Jul 15th 2014, Accepted: Apr 12th 2014.

ABSTRACT

BACKGROUND AND OBJECTIVE: Abdominal colic during infancy is a common complaint of parents within the first three months after the child's birth. As the intestinal microflora in these infants is different from non-colic newborns, we aimed to determine the effects of probiotics on the balance of intestinal microflora and reducing restlessness in infants with colic.

METHODS: This randomized clinical trial was performed on 44 breastfed infants (20-60 days old), with a birth weight of > 2500 g, suffering from colic, based on Wessel's definition. These infants received 1-5 drops of placebo (label 1) per day for five consecutive days. Afterwards, they were administered 2-5 drops of *Lactobacillus reuteri* (label 2) (17938 DSM) per day for 14 consecutive days. The parents were contacted twice on a daily basis and the duration of cramps and restlessness in infants was recorded and evaluated (IRCT=2014012713489).

FINDINGS: Among 44 infants, 36 cases completed the study. The mean period of restlessness after 5 days of receiving placebo and *L. reuteri* was 275±142.8 and 172±88.3 min, respectively ($p < 0.001$). Also, after 14 days of *L. reuteri* administration, the mean period of restlessness was 106±53.67 min.

CONCLUSION: The results showed that probiotic *L. reuteri* reduced crying and restlessness duration in infants with colic.

KEY WORDS: *Lactobacillus*, *Lactobacillus Reuteri*, Colic, Infant Colic, Probiotic..

Please cite this article as follows:

Akbarian Rad Z, Haghshenas Mojaveri M, Zahed Pasha Y, Ahmadpour-kacho M, Hajian K, Taghipoor Y. The Effect of Probiotic *Lactobacillus Reuteri* on Reducing the Period of Restlessness in Infants with Colic. J Babol Univ Med Sci. 2015;17(5):7-11.

*Corresponding Author: M. Haghshenas Mojaveri (MD)

Address: Non-Communicable Pediatric Diseases Research Center, Babol University of Medical Sciences, Amirkola, I.R.Iran

Tel: +98 11 32342151-5

Email: mati.mojaveri@yahoo.com

Introduction

Abdominal colic during infancy is a common complaint of parents within the first three months after the child's birth. According to previous research, the prevalence of colic has been estimated at 5-19%; however, in some studies, which applied different methods, the prevalence rate has been estimated at 40-50% (1,2).

Moreover, according to a previous study in Iran, the incidence rate of colic was calculated to be 20% (3). Infant colic syndrome was first defined in 1954 by Wessel as severe, persistent crying and restlessness, associated with facial flushing, lasting at least three hours per day, three times a week within three weeks to three months after birth (4,5). Some evidence suggests that gas-producing organisms are greater in number in the intestine of infants with colic. Moreover, some alterations occur in the intestinal microbial balance in these infants (6-8). Researchers have used probiotics to balance the intestinal flora of infants suffering from colic. In fact, probiotics can be used to stimulate systemic and mucosal immunity in the host intestine (9, 10).

Therefore, in recent years, particular attention has been paid to the treatment of digestive problems by probiotics. *Lactobacillus reuteri* (*L. reuteri*) is the most common microorganism, used in probiotic treatments. Common probiotics include *L. delbrueckii*, *bulgaricus*, *L. acidophilus*, *L. casei*, *L. fermentum*, *L. plantarum*, *L. brevis*, *L. lactis*, and *L. reuteri* (11). *L. reuteri* is one of the endogenous *Lactobacillus* species, inhabiting the human gastrointestinal tract. This substance has been used for many years as a probiotic in dietary supplements for adults. Recent studies have demonstrated that long-term use of these supplements can be beneficial and safe for infants, as well (12).

The results of a previous study showed that *L. reuteri* possesses inhibitory effects on visceral pain and reduces inflammation by increasing visceral hypersensitivity through the enteric nerves (13). The aim of this study was to evaluate the effect of

probiotic *L. reuteri* periods of restlessness in infants suffering from colic.

Methods

This clinical trial (IRCT: 2014012713489) was conducted on 44 breast-fed infants (aged 20-60 days, weight > 2500g), with complaints of crying and restlessness indicating colic, based on Wessel's criteria (4). Based on the clinical evaluation, these infants had no history of underlying medical diseases and had not used antibiotics or anti-colic medicines during the study period. Also, for the purpose of screening, urinary infections, which cause restlessness, were assessed via urinary analysis.

The infants received 1-5 drops of placebo (label 1) per day for five consecutive days. Afterwards, they were administered 2-5 drops of *L. reuteri* (label 2) (17938 DSM, made by BioGaia Co.) per day for 14 consecutive days. The parents were contacted twice on a daily basis and the duration of cramps and restlessness in infants was recorded and evaluated. For data analysis, parametric t-test was performed, using SPSS. $p < 0.05$ was considered statistically significant.

Results

Among 44 infants, 7 cases were excluded from the study due to the parents' lack of consent and development of bronchiolitis, leading to hospitalization (one case). Finally, 36 infants remained in the study. In total, 26 newborns (72.2%) were male and 10 infants (27.8%) were female. The mean age of infants at the beginning of the study was 35.78 ± 10.98 days (range of 20-55 days) (table 1). The mean period of restlessness in infants was 274 ± 142.8 min after five days of receiving placebo and 172 ± 88.3 min after five days of receiving *L. reuteri* ($p < 0.001$). Also, after 14 days of treatment with probiotic *L. reuteri*, the period of restlessness was 106.93 ± 53.67 min. During the administration of probiotic solution, there was no

significant correlation between the period of agitation and neonatal/maternal demographic characteristics such as infant's gender, weight at the time of study, mother's educational level (e.g., less than high school diploma or higher), mode of delivery (i.e., cesarean section and vaginal delivery) and maternal parity (i.e., multiparity or primiparity) (table 2).

Table 1. Demographic characteristics of the studied infants (N=36)

The studied variables		Mean±SD
Age (day)		35.78±10.98
Maternal parity		1.5±0.56
Gender N(%)	Male	26(72.2)
	Female	10(27.8)
Mode of delivery N(%)	Vaginal delivery	10(27.8)
	Cesarean section	26(72.2)
Mother's educational level N(%)	Less than high school diploma	8(22.2)
	High school diploma or higher	28(78.8)

Table 2. Comparison of the period of restlessness, based on subjects' demographic characteristics while using the medicines

The studied variables		Period of agitation Mean±SD	P-value
Gender	Female	116.43±60.56	0.1
	Male	113.15±57.11	
Mother's education	< High school	84.95±26.47	0.54
	High school ≥	122.38±61.17	
Maternal parity	Primiparous	108.45±62.70	0.54
	Multiparous	120.33±51.6	
Mode of delivery	Vaginal	113.20±45.16	0.95
	Cesarean	114.39±62.05	
	section		

Discussion

This study showed that five days after receiving the probiotic solution, the agitation time significantly reduced in infants with colic, as compared to the beginning of the study. Since the case and control groups were identical in this study, the effects of maternal diet, allergy to cow's milk protein, socioeconomic status and infant home-care were minimized. Also, by shortening the period of receiving placebo and *L. reuteri*, the effect of time on the process of colic was minimized. In this regard, Savino et al. compared the use of simethicone and probiotic *L. reuteri* in infants with colic and showed that probiotics have a greater impact on colic symptoms in infants (14). A study by Anabrees et al. also showed that breastfed infants with colic can benefit from the positive effects of probiotic supplements (15).

Moreover, Sarvino et al. introduced certain strains of *L. reuteri* (strains 55730 and 17938 DSM) as useful therapeutic agents. It should be mentioned that the 55730 strain was used as oral drops, with a dosage of 5-10 drops every three days for a period of 20 days (16, 17). The mechanism leading to the reduced period of restlessness by the use of *L. reuteri* supplements in infants with colic may be related to the negative effects of this probiotic on the growth of intestinal pathogenic bacteria, which may play a role in the presentation of colic. In this regard, Jones et al. showed that *Lactobacillus* can lead to the synthesis of cytokines and reuterin as an antimicrobial compound (18); this effect had been also reported by Christensen (19).

Contrary to the results reported in this study, Sung et al. evaluated the effect of *Lactobacillus* and placebo drug on the treatment of colic in a randomized trial. The results showed that during one month of treatment, the probiotic group was restless 49 min longer than the placebo group (20). In conclusion, the results of the present study suggest that *L. reuteri* solution can reduce the period of agitation in infants with colic. However, further research is required on this subject.

Acknowledgments

Hereby, we express our deepest gratitude to Amirkola Non-Communicable Diseases Research Center, the Vice-Chancellor for Research at Babol University of Medical Sciences, Dr.

Mohammad Motamedifor his cooperation with patient referral and Mrs. Hajar HosseinNia for her assistance.

References

- 1.Clifford TJ, Campbell MK, Speechley KN, Gorodzinsky F. Infant colic: empirical evidence of the absence of an association with source of early infant nutrition. *Arch Pediatr Adolesc Med.* 2002;156(11):1123-8.
- 2.Lucassen PL, Assendelft WJ, van Eijk JT, Gubbels JW, Douwes AC, Van Geldrop WJ. Systematic review of the occurrence of infantile colic in the community. *Arch Dis Child.* 2001;84(5):398-403.
- 3.Talachian E, Bidari A, Rezaie MH. Incidence and risk factors for infantile colic in Iranian infants. *World J Gastroenterol.* 2008;14(29):4662-6.
- 4.Illingworth R. Three Months Colic. *Arch Dis Child.* 1954;29(145):165.
- 5.Wessel MA, Cobb JC, Jackson EB, Harris GS Jr, Detwiler AC. Paroxysmal fussing in infancy, sometimes called colic. *Pediatrics.* 1954;14(5):421-35.
- 6.Fuller R. Probiotics in man and animals. *J Appl Bacteriol.* 1989;66(5):365-78.
- 7.Fanaro S, Chierici R, Guerrini P, Vigi V. Intestinal microflora in early infancy: composition and development. *Acta Paediatr Suppl.* 2003;91(441):48-55.
- 8.Lehtonen L, Korvenranta H, Eerola E. Intestinal microflora in colicky and noncolicky infants: bacterial cultures and gas-liquid chromatography. *J Pediatr Gastroenterol Nutr.* 1994;19(3):310-4.
- 9.Naidu A, Bidlack W, Clemens R. Probiotic spectra of lactic acid bacteria (LAB). *Crit Rev Food Sci Nutr.* 1999;39(1):13-126.
- 10.Saavedra JM. Clinical applications of probiotic agents. *Am J Clin Nutr.* 2001;73(6):1147S-51S.
- 11.Szajewska H, Mrukowicz JZ. Probiotics in the treatment and prevention of acute infectious diarrhea in infants and children: a systematic review of published randomized, double-blind, placebo-controlled trials. *J Pediatr Gastroenterol Nutr.* 2001;33(Suppl 2): S17-25.
- 12.Shamir R, Makhoul IR, Etzioni A, Shehadeh N. Evaluation of a diet containing probiotics and zinc for the treatment of mild diarrheal illness in children younger than one year of age. *J Am Coll Nutr.* 2005;24(5):370-5.
- 13.Coccorullo P, Strisciuglio C, Martinelli M, Miele E, Greco L, Staiano A. Lactobacillus reuteri (DSM 17938) in Infants with Functional Chronic Constipation: A Double-Blind, Randomized, Placebo-Controlled Study. *J Pediatr.* 2010;157(4):598-602.
- 14.Savino F, Pelle E, Palumeri E, Oggero R, Miniero R. Lactobacillus reuteri (American Type Culture Collection Strain 55730) versus simethicone in the treatment of infantile colic: a prospective randomized study. *Pediatr.* 2007;119(1):e124-30.
- 15.Anabrees J, Indrio F, Paes B, AlFaleh K. Probiotics for infantile colic: a systematic review. *BMC pediatr.* 2013;13:186.
- 16.Savino F, Cordisco L, Tarasco V, Palumeri E, Calabrese R, Oggero R, et al. Lactobacillus reuteri DSM 17938 in infantile colic: a randomized, double-blind, placebo-controlled trial. *Pediatrics.* 2010;126(3):e526-33.
- 17.Savino F, Tarasco V. New treatments for infant colic. *Curr Opin Pediatr.* 2010;22(6):791-7.
- 18.Jones SE, Versalovic J. Probiotic Lactobacillus reuteri biofilms produce antimicrobial and anti-inflammatory factors. *BMC Microbiol.* 2009;9(1):35.
- 19.Christensen HR, Frøkiær H, Pestka JJ. Lactobacilli differentially modulate expression of cytokines and maturation surface markers in murine dendritic cells. *J Immunol.* 2002;168(1):171-8.
- 20.Sung V, Hiscock H, Tang ML, Mensah FK, Nation ML, Satzke C, et al. Treating infant colic with the probiotic Lactobacillus reuteri: double blind, placebo controlled randomised trial. *BMJ.* 2014;348:g2107.