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Streptococcus thermophiles and *Lactobacillus delbruekii* subsp. *bulgaricus* and *L.acidophilus* survive gastrointestinal transit of Healthy volunteers consuming yogurt

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ABSTRACT

To date, It is significant to know that yogurt bacteria survival possible after passage through gastrointestinal transit. Theybelong to the probiotic bacteria which do help in the improvement of intestinal health benefits. There is a controversy regarding the survival of yogurt bacteria (namely, *Streptococcus thermophiles, L. acidophilus,* and *Lactobacillus delbruekii subsp. bulgaricus*) after their passage to intestinal transit. Culture on selective media investigated the survival of both bacterial species in human feces. Out of 20 samples recovered from 13 healthy subjects over 12 days of fresh yogurt intake,20 and 27 samples contained viable *S.thermophilus*(median value of 6.3×10^4 CFUg^{-1} of feces) and *L.delbruekii* (median value of 7.2×10^4CFU g^{-1} of feces), L.acidophilus (median value of 6×10^1 CFU g $^{-}$1) respectively. The present work's result indicates that substantial amounts of yogurt can survive human gastrointestinal transit.

Keywords: *Lactobacillus delbruekii, Lactobacillus acidophilus Streptococcus thermophiles*, yogurt

Introduction

Yogurt intake is well established with beneficial effects on human health. It also thoroughly studied the role of yogurt bacteria in the reduction of lactose intolerance. Fresh yogurt production containing probiotic bacterial starters namely *Streptococcus thermophiles*, *Lactobacillus acidophilus*, and *Lactobacillus delbruekiisubsp. bulgaricus* survive in the intestinal transit of humans. The goal of the present work was to assess the survival of the bacteria by culture analysis of feces from healthy subjects over 10 days of yogurt intake. Ten 25 to 50 years old volunteers were included in the analysis. They had no previous history of medical problems (serious diarrhea, surgery, dairy product intolerance).

Lactose intolerance

Lactose intolerance is probably the most common dairy intolerance problem- the inability to break down lactose so that your body can assimilate it. Lactase is the enzyme that digests the milk sugar lactose. If lactose remains in a dairy product you need to have this enzyme present to metabolize this sugar. Lactase can be produced by certain cells that line your digestive tract. However, many people are unable to produce lactase. This may be

genetic (you do not have the needed genes to produce this enzyme) or it may be an acquired defect.Dairyhaslive, beneficial lactobacillus bacteria present. These “good” bacteria help you break down the lactose. When the dairy product is pasteurized, as it is with most commercial milk and cheeses, these beneficial bacteria are unfortunately destroyed.The types of real, whole milk dairy products offer a complete source of protein, vitamins and minerals, and lots of probiotics, beneficial bacteria which produce helpful enzymes (such as lactase) and vitamins (such as folic acid, niacin, riboflavin, B6 & B12) that your body needs to function optimally. We can explain using probiotic bacteria namely *S.thermophiles, Lactobacillus acidophilus,* and *L.delbruekii* to solve such digestion issues. *Lactobacillus delbrueckii* subsp. *bulgaricus* is commonly used alongside *streptococcus thermophiles* as a starter for making yogurt the two species work in synergy, withL. *d. bulgaricus* producesamino acids from milk proteins, which are then used by *S. thermophiles* (Modzelewska,2008) Both species produce lactic acid, which gives yogurt its tart flavor and acts as a preservative. The resulting decrease in pH also partially coagulates the milk proteins, such as casein, resulting in yogurt's thickness. (Deng et al, 2015)

Probiotic bacteria

World Health Organisation (WHO) defines probiotics as live microorganisms that, "when administered in adequate amounts, confer a health benefit on the host. **Probiotics** are live microorganisms intended to provide health benefits when consumed, generally by improving or restoring the gut flora (Rijikers et al, 2007), there are numerous claimed benefits marketed towards using probiotic products by the consumer.Such as reducing inflammatory diseases, reducing gastrointestinal discomfort, improving immune problems health, relieving constipation, or avoiding the common cold. Health benefits have mainly been demonstrated for specific probiotic strains of the following genera: Lactobacillus, *Bifidobacterium*, *Saccharomyces*, *Enterococcus*, *Streptococcus*, *Pediococcus, Leuconostoc*, *Bacillus*, *Escherichia coli.(*Sabina Fijan,2014).

MATERIALS AND METHODS

The trial consisted of two consecutive periods. In the initial period of the 10 days, thevolunteer's diet is excluded from fermented milk, and cheese products including fresh yogurt from the normal diet. Throughout the period the volunteers observed the same diet restrictions but were asked to eat 3×125ml of fresh yogurt daily. The bacterial starters used for the production of yogurt are *S.thermophiles, Lactobacillus acidophilus,* and *L.delbruekii,* which show similar properties for microbiological, technological, and organoleptic properties to yogurt.

Yogurt manufactured from these strains contains 7.8×10^{8}CFU mL^{-1} viable *S.thermophiles*and 7.5×10^{8}CFU mL^{-1}viable *L.delbruekii* (Oozer et al 2004). After yogurt production, bacterial counts did not vary substantially for at least 1 month. For each sample, an aliquot of 1g was homogenized in 10ml casein yeast extract medium and 10-fold serial dilutions were prepared. Dilutions up to 10^{-9} of the initial fecal suspension were plated on MRS agar plates containing antibiotic concentrations used for selective recovery of *L.delbruekii* and M17 agar plates for *S. thermophiles* (Lindwall, 1984). Both the plates were incubated anaerobically at 42°C for at least 48h before the enumeration of colonies. Using this protocol, the detection limit for *S.thermophiles* or *L.delbruekii* in fecal samples was $10^{2}CFUg^{-1}$ of feces. Spores were also enumerated from the fecal dilutions according to the described procedure. Preliminary experiments confirmed that these selective media and growth conditions make it possible to unequivocally discriminate between the two bacterial culture techniques remain essential for theassessment of cell viability.

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RESULT AND CONCLUSION

From the selective plates of fecal samples, no colonies were observed during the first period of the trial, indicatingthe absence of antibiotic-resistantmicrobes. As a result of the second trial period through consumption of yogurt,spores were also present within the range of mean value 6.1×10^{6} $CFUg^{-1}$ of feces. Viable cells were recovered during the period of yogurt intake at levels of 4.0×10^{2} and 3.8×10^{6}CFU g^{-1} of feces. Most of the samples were positive for the detection of *L. delbruekii*. Bacterial levels varied between 5.0×10^{2} and 2.1×10^{7} $CFUg^{-1}$ of feces.The recovery is significantly consisting the yogurt bacteria in the upper compartments of the digestive tract. Together with studies reporting the metabolic activity of yogurt bacteria in the digestive tract provides evidence of the ability of bacteria in yogurtto exert probiotic effects on the host. The strains of yogurt also prevent other the growth of other bacteria from fecal microbiota. (delCampo et al,2005)Scientist Campo attempted to use specific PCR to identify *S. thermophiles* or *L. delbruekii* colonies grown on MRS or M17 plates. However, the accuracy of the method used by them is poor. In the present study, we took the advantage of spontaneous antibiotic-resistant variants for the specific detection of viable *S.thermophiles*and *L.delbuekii* in the feces of human volunteers consuming yogurt. The samples from the subjects all over contain less viable*S.thermophiles* but more viable sample subjects of *L.delbruekii subsp.bulgaricus.* This is to conclude that still after intake of yogurt prepared withprobiotic starters, theyare producing health-beneficial effects on different aspects ofthe human body. They are even survivinginside the gut biota producing the metabolic activity required andavoiding other microorganisms' entry.Finally, the probiotic bacteria is still surviving and protecting the human intestinal tract.

Table *Recovery of S. thermophilus, L. delbrueckii, and spore markers from feces of yogurtconsumers Number of volunteers whose feces contained viable microorganisms from yogurt*

s.no	No.of detections per sample	*S.thermophiles*	*L.delbruekii*	*Lactobacillus acidophilus*	Spores
1	Three times	9	12	10	13
2	Twice	1	0	0	1
3	Once	1	0	0	0
4	Never	1	0	0	0
5	Total volunteers	10	10	10	10

REFERENCES

[1]. Deng Y, Misselwitz B, Dai N, Fox M (2015) Lactose Intolerance in Adults: Biological Mechanismand Dietary Management Nutrients (Review) 7(9): 8020 – 8035.
[2]. del Campo, R., Bravo, D., Canton, R., Ruiz-Garbajosa, P., Garcia-Albiach, R., Montesi-Libois, A., Yuste, F.J., Abraira, V. and Baquero, F. (2005) Scarce evidence of yogurt lactic acid bacteria in human feces after daily yogurt consumption by healthy volunteers. Appl. Environ. Microbiol. 71,547–549.
[3]. Lindwall, S. and Fonden, R. (1984) Passage and survival of *L. acidophilus* in the human gastrointestinal tract. Int. Diary Fed. Bull. 21,179.
[4]. Modzelewska-Kapituła M, Klebukowska L, KornackiK,(2008) Evaluation of the possible use of potentially probiotic *Lactobacillus* strains in dairy products. International Journal of Dairy Technology 61, 165–169.
[5]. Oozier,R,Mater,D.D.G, Goupil-Feuillerat,N and Cortahier,G(2004)Initiationof protein synthesis by a labeled derivative of the Lactobacillus casei DN-114001 strain during transit from the stomach to the cecum in mice harboring microbiota.Appl.Environ.Microbiol.70,6992-6997.
[6]. Pochard, P., Dewit, O, Desjeux, J.F. and Bourlioux, P. (1989) Viable starter culture, beta-galactosidase activity, and lactose in the duodenum after yogurt ingestion in lactase-deficient humans. Am. J. Clin. Nutr. 49,828–831.
[7]. Rijkers GT, de Vos WM, Brummer RJ, Morelli L, Corthier G, Marteau P (2011). "Health benefits and health claims of probiotics: Bridging science and marketing". *British Journal of Nutrition*. **106** (9): 1291–6
[8]. Sabina Fijian (2014) Microorganisms with Claimed Probiotic Properties: An Overview of Recent Literature, InternationalJournal of Environmental research and public health 11(5): 4745–4767.
[9]. Abdelbasset, M. and Djamila, K. 2008. Antimicrobial activity of autochthonous Lactic acid bacteriaisolated from Algerian traditional fermented milk “Raib”. Afr J Biotechnol. 7(16): 2908-2914.
[10]. Bessis, D., Le Quellec, A., Sotto, A., Perez, C. and Ciurana, A.J., 1995. Lactobacillus acidophilus endocarditis after an appendectomy. Clin Infect Dis. 20(3):724–725.
[11]. Corry, J.E.L., Curtis, G.D.W. and Baird, R.M. Handbook of Culture Media for Food and Water Microbiology. RSC publishing. 2011.
[12]. Fuller, R., Perdigon, 2000. Immunomodulation by the Gut Microflora and Probiotics . Gabriela (Eds)
[13]. Harrigan, W. F. and Mc Cance, M. E. Laboratory Methods in Microbiology, Academic Press, New York 1966.
[14]. Khalid, K. 2011.An overview of lactic acid bacteria.International Journal of Biosciences .1(3):1-13.
[15]. Leroy, F. and Vuyst, L.D. 2004. Lactic acid bacteria as functional starter cultures for the food fermentation industry. Trends Food Sci Tech. 15(2):67–78.
[16]. Reid, G., Jass, J., Sebulsky, M.T. and McCormick JK. 2003. Potential uses of probiotics in clinical practice. Clin Microbiol Rev. 16(4):658-672.
[17]. Steinkraus, K.H. 2002. Fermentations in World Food Processing. Comprehensive Reviews in Food Science and Food Safety.
[18]. Antimicrobial Activity – The most important property of probiotic and starter lactic acid bacteria. Food Technol. Biotechnol. 48(3):296–307.
[19]. Wood, B.J.B. and Holzapfel, W.H. 1995. The Genera of Lactic Acid Bacteria, vol. 2.Aspen Publishers, Gaithersburg, MD.