Institute of Experimental Morphology and Anthropology with Museum
Bulgarian Anatomical Society

Acta morphologica et anthropologica, 15
Sofia • 2010

Role of the Probiotic Biomilk on Induced Ulcerogenesis

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The effect of probiotic Biomilk in a dose of 1600 mg/kg b.w. for 30 consecutive days in Indomethacin-induced gastric ulcer in white male rats was studied. Indomethacin was subcutaneously injected in a dose of 20 mg/kg b. w. Malondialdehyde (MDA) was examined in plasma, liver and brain homogenates. Indomethacin caused the formation of numerous lesions and haemorrhages and enhanced MDA level in plasma, liver and brain tissues. The probiotic Biomilk restricted the lipid peroxidation and protected the gastric mucosa from Indomethacin ulcerogenic action. Thus it could represent a non-pharmacological alternative for the prevention and treatment of gastric ulcer in man.

Key words: Probiotic Biomilk, Indomethacin, malondialdehyde, gastric mucosa protection, histology.

Introduction

A series of gastrointestinal diseases, infections are favourably influenced by the products containing original *Lactobacillus Bulgaricus* (1,4). The probiotic Biomilk is a dry lactic-acid, low-lactose product containing liver cells of *Lactobacillus Bulgaricus*.

The purpose of the present study is to establish the effect of the probiotic Biomilk in a model of Indomethacin-induced ulcerogenesis in rats.

Material and Methods

The study covered 28 white male Wistar rats weighing 180-200 g. The experimental design is demonstrated in Table 1.

Indomethacin was chosen as an ulcerogenic agent because of its well-known ulcer-inducing and pro-oxidative action. The stomachs were taken for examination 4 hours after Indomethacin administration under ethereal narcosis. The number and surface of the mucous defects were read by means of macroscopic inspection of the stomachs. Histological sections were stained with haematoxilin/eosin (HE) and with PAS.

Table 1. Study design

Group	Treatment	Dose, ml/kg	Duration	Number of animals
I	Distilled water	10	30 days	7
II	Biomilk	1600	30 days	7
III	Biomilk + Indomethacin	1600 20	30 days one day	7
IV	Distilled water + Indomethacin	10 20	30 days one day	7

Malondialdehyde (MDA) as a marker of lipid peroxidation was estimated after the method of Porter et al. (1976) in blood plasma, liver and brain homogenates. The statistical analysis of the data was carried out after ANOVA method.

Results

Histological examination

Probiotic Biomilk applied alone increases gastric mucus secretion in comparison with distilled water (Fig. 1). The application of Indomethacin causes erosions covering 2/3 or almost the whole thickness of the gastric mucosa with hemorrhages. There is no cellular infiltration at all. These defects are characterized with a greater depth and a larger surface of dissemination (Fig. 2). In the surrounding zones there is hyperemia in the vessels. The amount of mucilaginous substances is strongly reduced. In the animals treated with Biomilk in a dose of 1600 mg/kg b. w.) and Indomethacin the erosions in the gastric mucosa are more superficial and smaller in size (Fig. 3). The mucilaginous secretion in the neighbouring areas is slightly increased.

Fig. 1. Probiotic Biomilk in dose 1600 mg/kg applied alone increases gastric mucus secretion. PAS reaction, Mc Manus (original magnification 10×20)

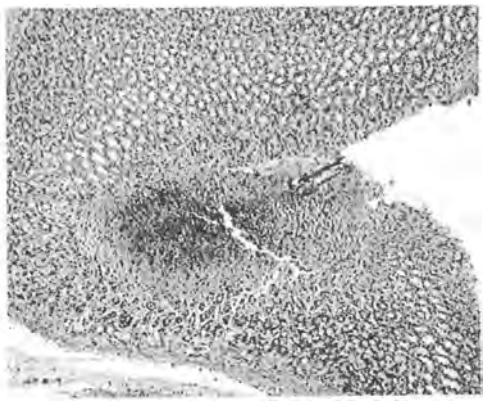

Fig. 2. Indomethacin causes erosions covering 2/3 or almost the whole thickness of the gastric mucosa with hemorrhages; the amount of mucilaginous substances is strongly reduced. PAS reaction (original magnification 10×10)

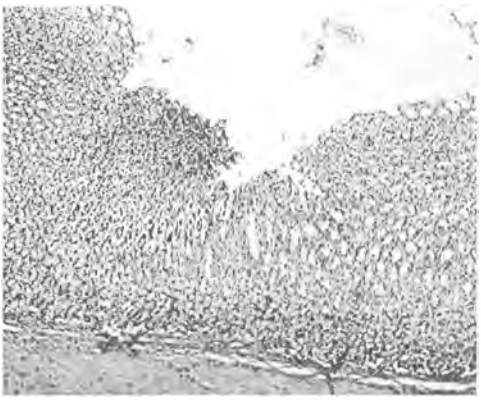

Fig. 3. The erosions in the gastric mucosa are superficial and smaller in size Biomilk in dose 1600 mg/kg + Indomethacin. Staining with HE (original magnification 10×10)

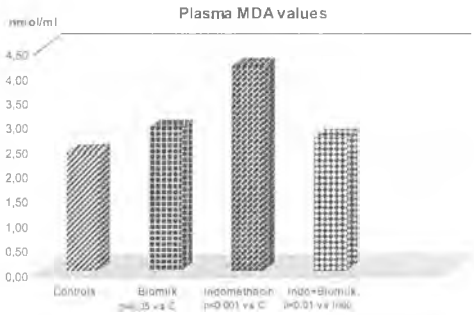

Fig. 4. Plasma MDA values

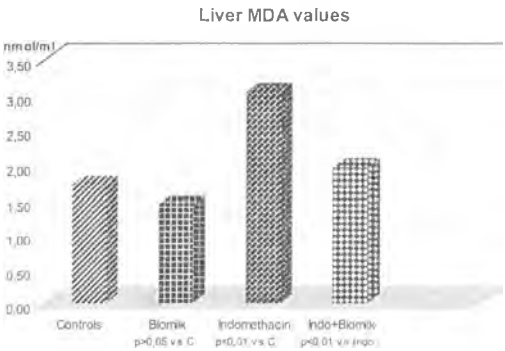

Fig. 5. Liver MDA values

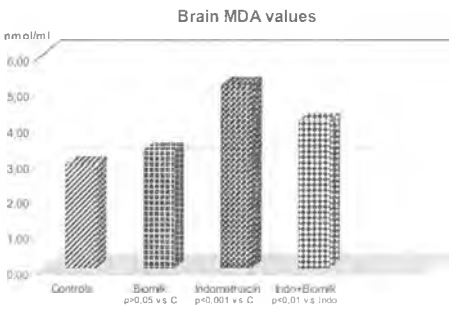

Fig. 6. Brain MDA values

MDA in plasma, liver and brain homogenates

MDA in plasma

In the animals treated Biomilk only, MDA plasma values did not differ significantly from these of the controls (p>0,05). Indomethacin treatment caused a significant (p<0,001) MDA increase in plasma as compared with that of the controls. MDA in plasma reduced in the group with Biomilk+Indomethacin (Fig. 4).

MDA in liver homogenate

In the animals treated with Biomilk only, MDA values in a homogenate of liver tissue did not differ significantly from these of the controls (p>0,05). Indomethacin treatment caused a significant (p<0,01) MDA levels increase in the liver homogenate as compared with that of the controls. In the liver homogenate, MDA values reduced significantly (p<0,01) in the animals of the group with Biostim LBS+Indomethacin when compared with these with Indomethacin only (Fig. 5).

MDA in brain homogenate

In the animals treated with Biomilk or *Lactobacillus Bulgaricus* only, MDA values in a homogenate from brain tissue did not differ significantly from these of the controls (p>0,05). Indomethacin caused a significant (p<0,001) MDA level increase in the brain homogenate as compared with that of the controls. In the brain homogenate, MDA

values reduced significantly ($p<0,01$) in the animals of the group with Biomilk + Indomethacin as compared with these of the group on Indomethacin treatment only (Fig. 6).

Discussion

Indomethacin affects the mucilaginous and bicarbonate secretion of the mucosa and induces blood flow disorders [6]. Preliminary treatment with Biomilk leads to protection of the gastric mucosa. The authors relate this with the increased mucilage synthesis; with enhanced prostaglandin E2 production which is gastroprotective; with improved microflora and microecology; with receptor competition and immunomodulation in the intestinal lymphoid tissue [2,3].

Indomethacin causes MDA elevation in plasma, liver and brain homogenates that allows the assumption of oxidative stress involvement. In the group with Biomilk + Indomethacin these parameters were favourably influenced upon. One of the mechanisms of ulcerogenic action of the Indomethacin is the activation of the processes of lipid peroxidation in the tissues. It is probably that the restriction of the lipid peroxication is an element of the protective action of this probiotic. The antioxidant activity is likely determined by the number of live cells of *Lactobacillus Bulgaricus* [7].

Based on the data presented above the conclusion can be drawn that the chronic treatment with Biomilk containing *Lactobacillus Bulgaricus* posseses a clinical effectiveness concerning the Indomethacin-induced pathology of the gastric mucosa. The probiotic Biomilk could represent a non-pharmacological alternative for the prevention and treatment of ulcer disease in man.

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