

## 81. Protection Against Lead Contamination by Strains of Lactic Acid Bacteria From Fermented Camel Milk

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### Introduction

Heavy metals are widely responsible for environmental contamination (3). The pollution of some areas by lead (Pb) is a health hazard for consumers of dairy products because this metal is concentrated throughout the food chain. One of the most frequently described problems in lead toxicity is saturnism, cancer and anemia. Camel milk and fermented *shubat*, its derivative product could be contaminated (4, 7, 8). The lactic fermentation of *shubat* could reduce the availability of lead in the digestive tract of consumers because lactic acid bacteria (LAB) are able to absorb this metal which is then excreted in the faeces (1, 2, 5, 6). Therefore, the present study was carried out to determine *in vivo* the effectiveness of the fermented milk for decreasing the absorption of Lead Nitrate (PB2(NO3)).

### Material and Methods

Female cavies (250-300 g) were housed in standard metal cages (10 cavies/cage). They were divided into four treatment groups: (1) cavies not receiving lead and used as control group, (2) treated group with 2 mL of solution containing Lead Nitrate (0.5 ppm) and named Lead Nitrate treated cavies, (3) cavies treated with 2 mL of milk product fermented by 4 different LAB strains having proved capacity to absorb Pb (9, 10, 11, 12), (4) cavies treated with 2 mL of milk product fermented by 4 different LAB strain in which the same concentration of Lead Nitrate than group 2 was dissolved. Cavies were orally administered their respective doses every day for 21 days. Water and food were provided *ad libitum*. Heart, lungs, liver, kidney, spleen and blood were collected and analyzed for lead quantity. Faeces were collected every 7 days and also analyzed for lead quantity.

### Results

Levels of 0.32, 0.12, 0.32 and 0.1 ppm of lead concentration were found in milk, water fodder and HNO<sub>3</sub> respectively. There was no difference between control group (1) and group (2) for the Pb content in the faeces of cavies, except for 4<sup>th</sup> week where higher concentration (1.57 ppm) was observed. These results need to be confirmed (Figure 1). The lead concentration in faeces is higher in the groups 3 and 4 compared to control group (Figure 2). However, in the 3<sup>rd</sup> group which was not treated by lead, the quantity of this metal is also higher than in control group. The highest quantity of Pb was in 4<sup>th</sup> group, but the fecal content of lead in those groups changed during the study.

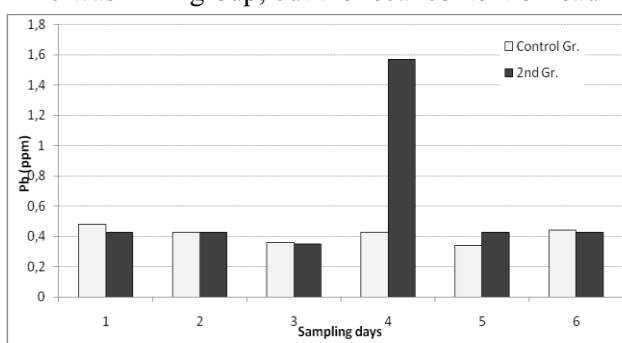


Figure 1. Lead concentration in feces of control and lead nitrate groups

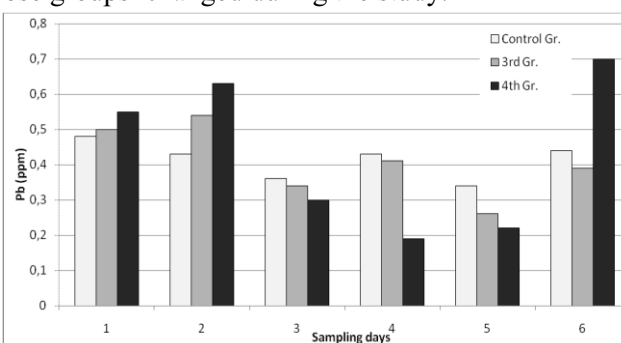


Figure 2. Lead concentration in feces of control, 3<sup>rd</sup> and 4<sup>th</sup> groups

In the different cavies' organs of group 2 (receiving enriched Pb solution in water), the higher concentration of heavy metal was observed in spleen (1.04), heart (0.65), kidneys (0.58), blood (0.46)

to be compared to 0.82, 0.2, 0.58 and 0.31 respectively in control group (Figure 3). In groups treated with fermented milk without and with Pb, the lead concentration decreased in targets organs (spleen, kidneys, liver and lungs). The Pb concentration in blood and heart was similar in control, 3<sup>rd</sup> and 4<sup>th</sup> groups (Figure 4) in spite of the lead treatment in the 4<sup>th</sup> group.

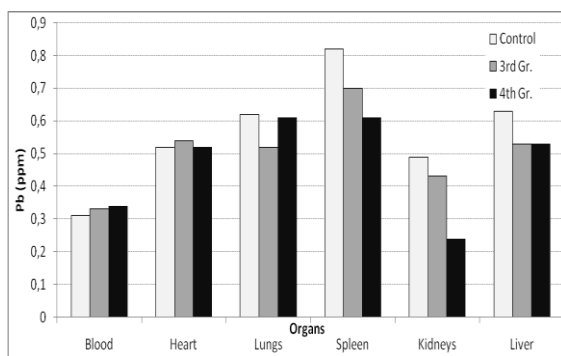


Figure 3. Lead concentration in organs of control and lead nitrate groups

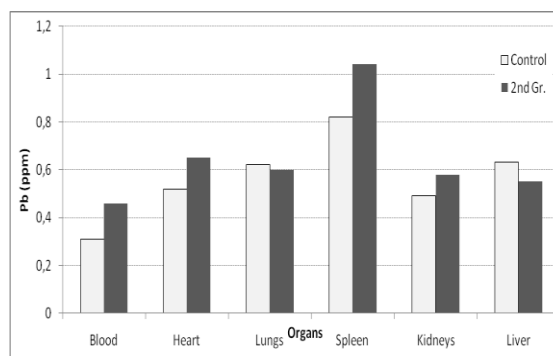


Figure 4. Lead concentration in organs of control, 3<sup>rd</sup> and 4<sup>th</sup> groups

## Discussion and Conclusion

The lead concentrations in feces of control group and lead nitrate treated group were almost the same. The fecal lead concentration increased in groups treated by milk fermented by strains of LAB. However, the fecal excretion of Pb was not constant. Although the 3<sup>rd</sup> group wasn't treated, the quantity of fecal Pb was higher than in control group. It's quite possible that Pb formerly existing in organism was eliminated due to the absorbing effect of LAB strains. Lead was concentrated mostly in spleen, blood, heart and kidneys. In groups treated with fermented milk the Pb concentration decreased in organs. Even if cavies were treated, the Pb concentration in heart and blood remain similar to control group.

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