

Assessment of genomic stability of folic acid supplemented goat or cow milk-based diets

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Goat milk has beneficial nutritional characteristics such as improved Ca and P absorption and zinc and copper utilization in comparison to cow milk and has been shown to enhance antioxidant status in animal models. Despite its favorable nutritional quality, goat milk is low in folic acid⁽¹⁾ an essential vitamin which acts as cofactor regulating many different pathways such as cell growth, differentiation, DNA repair, apoptosis and prevention of carcinogenesis.

Therefore, the current study was carried out to assess the effect of goat or cow milk-based diets, either with normal-folic or high folic acid content, on the oxidative stress-mediated damage to DNA.

4 × 10 Wistar outbred albino rats (42 ± 5 g body weight) were fed for 30 days with goat milk or cow milk-based diets, with normal folic acid (2 mg/kg diet) or high folic acid content (40 mg/kg diet). On day 31, samples of blood from the caudal vein were obtained to measure DNA stability in isolated lymphocytes using a single cell gel electrophoresis comet assay as previously described⁽²⁾.

The background DNA damage was much lower in rats given the goat milk-based diet than in those rats that consumed the cow milk-based diet as revealed by the high percentage of DNA in the head (Fig. 1.; *P* < 0.001), low percentage of DNA in tail (Fig. 2.; *P* < 0.001) and low olive tail moment (Fig. 3.; *P* < 0.001) which is defined as the product of the tail length and the fraction of total DNA in the tail. Folic acid supplementation of the goat milk-based diet had a small beneficial effect on DNA stability, reducing the Olive Tail Moment in comparison with the cow milk-based diet (Fig. 3.; *P* < 0.01), due to its crucial role for DNA synthesis and repair⁽³⁾, reducing the fragmentation of the DNA.

The beneficial effect of goat milk on DNA damage most likely relates to the enhancement of enzymatic antioxidant defence as previously observed⁽⁴⁾, limiting the generation of free radicals and cell damage. A further factor could be the positive effect of goat milk on mineral utilization, such as the enhanced availability of Mg⁽⁵⁾, which supports genomic stability by acting as an essential cofactor in several pathways and is required for double-strand break repair⁽⁶⁾.

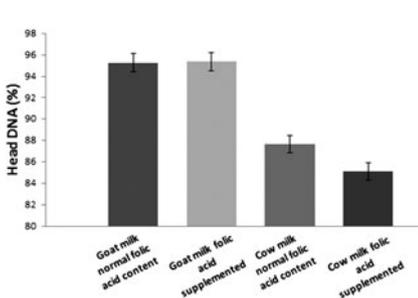


Fig. 1. Head DNA

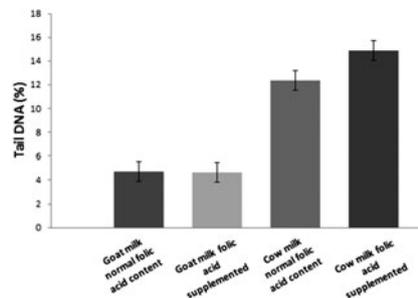


Fig. 2. Tail DNA

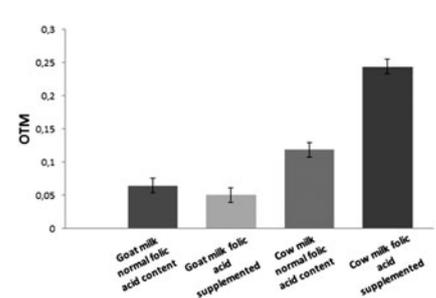


Fig. 3. Olive Tail Moment

In conclusion, goat milk has beneficial effects, protecting cell DNA from free radicals oxidative damage, and a supplementation with folic acid enhances this protective effects thus, it would be really positive strategy to include this natural food with folic acid-supplement in the habitual diet of populations in risk of suffering oxidative stress.

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