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MODULATION OF THE HUMAN AGED IMMUNE RESPONSE BY DONKEY MILK INTAKE

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INTRODUCTION

Immunosenescence is characterized by a progressive decline of immune functions with age and both innate and adaptive immune responses are severely impaired (Jirillo et al., 2008; Chen et al., 2009). This physiological status increases the susceptibility of old people to infections, tumours and autoimmune diseases. (Panda et al., 2009; Chen et al., 2009). Nutrition seems to be fundamental in the mechanism of immune recovery in the elderly.

It is known that human milk contains several components having immunological activity such as s-IgA antibodies, Interferon-γ, Lactoferrin, Lysozyme, hormones and Growth Factors which exert defensive mechanisms (Newman, 1995).

It has been hypothesized that donkey milk could have a beneficial effect in the immunocompromised host for the inhibition of bacterial activity and prevention of atherosclerosis because of its antioxidant properties (Conte et al., 2004; D'Alessandro, 2007).

A recent study on evaluation of the in vivo effects of donkey's colostrum and milk on human healthy blood mononuclear cells showed that colostrum induces secretion of s-IgA, while milk prevalently promoted production of IgG and release of regulatory, pro-inflammatory and anti-inflammatory cytokines. Moreover, donkey milk induce the production of nitric oxide (Tafaro et al., 2007). All this supplies a further support to use of donkey milk in prevention of disease of old people.

AIM The aim of the study was to evaluate the effects of intake of donkey milk on serum cytokine profile in aged subjects.

SUBJECTS AND METHODS

Aged Subjects

- Number: 6 (females)
- Age: 72 - 97 years
- Characteristics: Clinically health (no drug assumption)

+ Donkey Milk

1 cup (200 mL) per day for 1 month

Blood Collection

T 0 BEFORE milk intake

T 1 AFTER milk intake for 1 MONTH

Jennies of Martina Franca breed - Alberobello (BA) – South Italy

Milk for human feeding

Determination of Cytokines

IL-12, TNF-α, IL-10, IL-6, IL-1ß, IL-8

- On blood serum at: T0 – T1 and T (Control)
- Method: Multiplexing Assay in Cytofluorimetry
- Flow cytometer: FACSalibur (Becton Dickinson)
- Software: CellQuest Software; CBA Analysis Software
- Kit: CBA Human Inflammation
- Statistical Analysis: GraphPad Prism 5.0 package

Normal Donors - Control

- Number: 10
- Age: 30 - 45 years
- Characteristics: Healthy

Without Intake of Donkey Milk

Blood Collection

T- Control

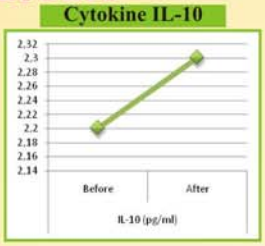
RESULTS

Cytokine IL-12

Serum levels of Il-12 were undetectable either before or after donkey milk intake. Normal values in control donors ranged between 0.0 to 28.0 pg/ml.

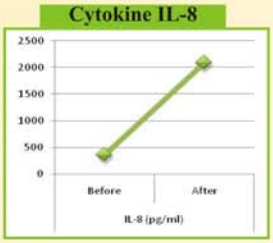
Cytokine IL-10

Basal levels of IL-10 (2.2 pg/ml) resulted within a normal range. No significant increase was found after milk administration (2.3 pg/ml) Normal values in control donors ranged between 0.0 to 9.0 pg/ml.



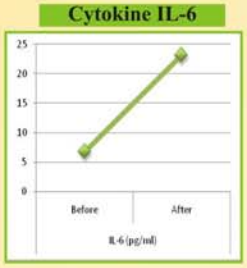
Cytokine IL-8

Donkey milk administration determined a marked increase of IL-8, from 352.3 pg/ml at T0 to 2081.7 pg/ml at T1. Normal values in control donors ranged between 1.5 to 6.0 pg/ml.



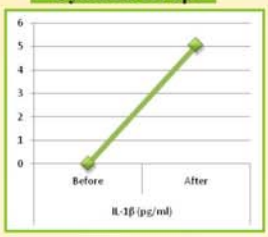
Cytokine IL-6

The IL-6 values were moderately high at T0 (6.7 pg/ml) and increased after donkey milk administration (23.0 pg/ml). Normal values in control donors ranged between 0.0 to 9.5 pg/ml.

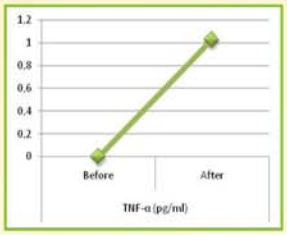


Cytokine IL-1β

Both IL-1β e TNF-α cytokines were not detected at T0, but after milk administration they slightly increased to 5.0 pg/ml and 1.0 pg/ml, respectively, reaching values within the normal ranges. Normal values in control donors were: IL-1β = 0.0 – 265.0 pg/ml; TNF-α = 0.0 – 7.0 pg/ml.



Cytokine TNF-α



CONCLUSIONS

A critical analysis of the results leads to the conclusion that donkey milk is an enhancer of acute phase response and, in a lesser extent, of pro-inflammatory cytokine response. Taken together, these findings indicate that a regular intake of donkey milk in moderate amount (200 ml/day) is able to up-regulate the immune response in aged host.

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