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Effect of dietary sialic acid supplementation on saliva content in piglets

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Background - Saliva contains sialic-acid (SA) containing proteins (mucins) that influence its viscosity and protective properties. Dietary intake of SA may be responsible for differences in the salivary SA levels between breast-fed and formula-fed infants.¹

Objective - To investigate the effect of supplementation with casein glycomacropeptide (cGMP, a protein-bound source of SA) on salivary concentration in piglets during the first 5 weeks of life.

Design - Twenty 3-day-old male domestic piglets (*Sus scrofa*) from 4 litters were distributed evenly to 2 groups. The control group (n=10) was fed a standard diet of soy/whey/casein sow milk pig-replacer (55:9:36) containing 150 mg/L of naturally-occurring SA. The treatment group (n=10) received a similar formula in which cGMP replaced some of the whey and casein such that the final level of SA was 600 mg/L. Milk intake in both groups was 285 ml/kg/day during the first 2 weeks and 230 ml/kg/day for the remaining weeks, therefore the control group received 43 mg/kg/day of SA and the treatment group 170 mg/kg/day. Saliva samples (0.5-1mL) were collected once per week. Free and bound SA content were determined using HPLC.¹ During the first two weeks, 7 piglets in the control group and 4 piglets in the treatment group required antibiotics (3-day) for weaning diarrhoea.

Outcomes - Rate of weight gain was similar in the two groups (170 g/day in the control group, 155 g/day in treatment P=0.44). Total salivary SA content varied from 2% to 41% higher in the treatment group compared with the controls. The difference was significant on day 10 and day 24 (429±80, 366± 47mg/L in treatment and 253± 32, 265± 29 mg/L in control respectively, P<0.05), but not on days 17 or 31. The time trends over the whole time period were not significantly different. The majority of SA was in the bound form (>93%) and showed the same trends.

Conclusions-The findings of this study suggest that a protein-bound dietary source of SA such as cGMP increases the SA content of saliva. The level of SA in saliva may be indicative of that found in other serous fluids, plasma and other tissues, including the brain. There are implications for both immunity and development.

1. Wang B, Brand Miller J, Sun Y, Ahmed Z, McVeagh P, Petocz P (2001) A longitudinal study of salivary sialic acid in preterm infants: comparison of human milk-fed vs formula fed infants. *J Pediatr* 138:914-6

Palm fruit extracts protect against oxidative damage in human red blood cellsN Balasundram^{1,2}, NS Agar¹, K Sundram², S Samman¹¹ *School of Molecular and Microbial Biosciences, University of Sydney, NSW 2006*² *Malaysian Palm Oil Board, 6 Persiaran Institusi, 43000 Kajang, Malaysia*

Background – Palm fruit (*Elaeis guineensis*) extracts have been shown to exhibit antioxidant activity in a liposome model system, acting as scavengers of reactive oxygen species via hydrogen- and electron-donating mechanisms (1).

Objective - To evaluate the antioxidant properties of palm fruit crude extract (CE) and ethanolic extract (EE) in an *ex vivo* model system using human red blood cells (RBC).

Design – Blood was obtained from healthy volunteers and collected in heparine-tubes. It was centrifuged at 3000 RPM for 20 min and RBC washed three times with phosphate buffered saline (PBS) pH 7.4. The cells were suspended in PBS to obtain a haematocrit of 10% when incubated at 37°C with 50 mM 2,2'-azobis-(2-amidinopropane) dihydrochloride (AAPH), with no extracts (Control), or with CE or EE at a final concentration of 0.1 mM gallic acid equivalence (GAE). Aliquots were taken at timed intervals over 6 h, for measurement of haemolysis, and concentrations of reduced glutathione (GSH) and methaemoglobin (MetHb). In a separate series of experiments, MetHb formation in haemolysate was induced by 1.8 mM NaNO₂, and the effects of CE and EE on the rates and extent of MetHb-formation were then measured.

Outcomes – Both CE and EE protected RBC from AAPH-induced haemolysis in a dose dependent manner. After 6 h of incubation, the degree of haemolysis in the Control was 64.3 ± 14.6%, compared with 25.9 ± 11.7% and 24.8 ± 12.9% for RBC treated with CE and EE respectively. However, no consistent effects were observed in GSH and MetHb concentrations over 6 h. Both CE and EE inhibited NaNO₂-induced MetHb-formation in haemolysates. At 0.1 mM GAE, the inhibition was 73.3 ± 5.7% for CE and 79.9 ± 3.9% for EE.

Conclusions – Palm fruit extracts delayed AAPH-induced haemolysis in human RBC. These findings suggest that the extracts protect the RBC membrane against oxidative damage induced by peroxy radicals. The results also suggest that palm fruit extracts reduce the rate and extent of oxidation of haemoglobin exposed to oxidative stress.

1. Balasundram N, Bubb W, Sundram K, Samman S. Antioxidants from palm (*Elaeis guineensis*) fruit extracts. *Asia Pac J Clin Nutr* 2003; 12 (Suppl): S37.