

# EFFECT OF FLUORIDE INGESTION ON SIALIC ACID CONTENT OF BONE AND SERUM

A.K. Susheela and Mohan Jha

Fluorosis Research Laboratory, Department of Anatomy,

All India Institute of Medical Sciences,

New Delhi - 110 029, India

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In a recent publication, it has been reported that cortical and cancellous bones differ biochemically and that fluoride ingestion in excess exerts diverse effects (1, unpublished data). Fluoride ingestion has also led to the formation of cartilagenous loci within well developed trabeculae of cancellous bone with enhanced sulphated glycosaminoglycan (2, unpublished data). In the present communication, the status of sialic acid, an important constituent of glycoproteins, in bone (cortical and cancellous) and serum is reported.

*Sialic acid content in serum and bone of control rabbits and rabbits treated with sodium fluoride*

	Serum	Cancellous bone	Cortical bone
Control	61.97 ± 1.89	0.08 ± 0.01	0.08 ± 0.01
Fluoride treated			
3 months	42.83 ± 3.01*	0.09 ± 0.01	0.05 ± 0.01*
8 months	26.59 ± 3.27*	0.15 ± 0.04*	0.05 ± 0.01*
10 months	42.71 ± 4.78*	0.13 ± 0.03*	0.06 ± 0.01*
12 months	50.83 ± 3.41*	0.15 ± 0.06*	0.06 ± 0.01*

Data expressed as mg% (means ± SD). \*P < 0.05 (in comparison to control). 5 Animals per group.

**Materials and methods:** Rabbits weighing 600 to 800 g were fed sodium fluoride 10 mg/kg body weight daily through the intragastric route up to a period of 12 months. The rabbits were killed at varying intervals (3, 8, 10 and 12 months, 5 animals per group) after fluoride treatment. Blood samples were collected by cardiac puncture and serum separated out. The cortical diaphyseal bone from the femur and cancellous bone from the iliac crest region of pelvic girdle were dissected out and bone freed from marrow. Fat free bone powder was prepared using an ether/acetone mixture (1:1) and acetone. Sialic acid from serum (3) and bone (4) were determined. Control animals were given similar treatment but deprived of sodium fluoride.

**Results and discussion:** The data obtained on sialic acid content of serum (table) reveals a significant reduction in the circulating levels after fluoride ingestion. This observation is consistent with the results reported on other protein bound carbohydrates in fluoride poisoning (5, unpublished data). The sialic acid level of cancellous and cortical bones unlike other biochemical parameters studied (1) was the same in both the bones irrespective of structural and other biochemical variations. The effect of fluoride ingestion on the sialic acid content of cortical and cancellous bones, however, was distinctly different. The sialic acid content increased in cancellous bone, whereas in cortical bone, it fell significantly.

The increased sialic acid content in cancellous bone, is possibly due to the 'osteoid' formation. The osteoids are known to be active sites of bone formation and require more calcium ions. Sialic acid possibly binds the calcium ions (6, 7) and becomes deposited in cancellous bone. Increased levels of calcium due to fluoride ingestion in cancellous bone, (unpublished data) supports this possibility. It has been reported that sialic acid binds to calcium (7) and *in vitro* prevents the calcium phosphate precipitation (8). This may be one of the reasons for the poor mineralization known to occur in osteoids formed during fluoride poisoning (unpublished data). The significant reduction of sialic acid content in cortical bone is an effect which needs to be explored further, to understand the mechanism of fluoride action on cortical bone.

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