IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 2 Ver. 11 February. (2018), PP 58-59
www.iosrjournals.org

Inhibitory Effects of Nickel Chloride on Bone Composition

Khalid H. Gathwan[1], Khalil Ismail A. Mohammed[2], Suha T. Abd [1],
Heba F. Hassan[1], Fadia A. Al-khayat[1], Rash A. Azeez [1]
[1-]*College of Dentistry,University of Baghdad, Baghdad-Iraq*
[2-]*Collage of medicine, clinical communicable diseases research unit, University of Baghdad*
Corresponding Author: Khalid H. Gathwan

Abstract: *To study the effect of nickel chloride on bone composition of mice, a number of biophysical and biochemical parameters have been made use. The animals were divided into control and experimental and further subdivided into three groups I, II and III according to the dose of nickel chloride (NiCl2) administered to them i.e. 5.8, 12.8 and 28.2 mg/kg body weight, respectively. Femur bones were obtained by sacrificing the animals three weeks after weaning them once a week. The percentage loss between the wet weight and dry weight of femur in control animals was found to be 32.5+1.5 .In the three experimental groups I,II and III, the percentage loss was 30.4+1.4, 35.3+2.3 and 38.9+2.2 respectively. The percentage loss between the wet weight in wet water and dry weight in wet water was 36.1+2.3 in the controls and 36.6+1.9, 39.5+2.2 and 51.1+3.1 respectively in the three experimental groups.*

Key words: *Nickel Chloride(NiCl2), femur, Bone.*

Date of Submission: 09-02-2018 Date of acceptance: 24-02-2018

I. Introduction

Many studies have considered bone as a component of extracellular matrix (1,2). The water constitutes about 26% of bone volume (3) and is believed to facilitate interactions between the other two phases of the bone extracellular matrix via the minerals and the organic matrix .

The organic matter accounts for one-third (30-35%) of dry weight of bone and the rest it constituted by inorganic matter (4,5). Trace metals are thought to play several roles in synthesis of bone, cross-linking, calcification and diseases of the connective tissue (6). There has been an increasing concern about the entry of potentially harmful substances and trace elements intothe food chain destined for human consumption (7, 8).

So the aim of this study was to determine the effect of NiCL2 on the composition of organic and inorganic components of bone.

II. Material and Methods

Twenty four adult male mice Balb/C weighing 32-36 gm. The animals were divided into two main groups, the control and the experimental groups. The experimental animals were further subdivided into three groups and were daily administered NiCL2 doses of (5.8, 12.6 and 28.2) mg / Kg of body weight.

The weight of each mice was recorded once a week for twenty one days, then sacrificed and the femur bone was taken out; the bone marrow was flushed out with normal salineafter careful removal of soft tissues. The wet weight and dry weight of bone were taken within 6 hours of sacrifice.

III. Results and Discussion

The changes on bone composition on the bone collagen matrix have been studied with three different doses of NiCL2 (5.8, 12.8 and 28.2 mg/kg). There was a decrease in wet and dry weight of the femur bone in control and experimental groups , the percentage decrease in control group was found to be 32.5+1.5 , while in the experimental groups, the decrease was 30.4+1.4 in group I (5.8 mg/kg NiCL2), 33.5+2.3 in group II (12.8 mg/kg NiCL2) and 38.9+2.8 in group III (30.1 mg/kg NiCL2) , the same observations were made by reheating the wet and dry samples , the percentage weight loss was 36.1+2.3 in control and 36.6+1.9 (group I), 39.5+2.2 (group II) and 51.2+3.1(group III) in experimental mice (Table 1). The percentage change in dry weight and dry wet weight indicate that there is an increase in weight loss with NiCL2 dose administered. The percentage increase in weight loss is suggestive of low cellular synthesis of bone mass in NiCL2 treated animals as compared to controls. These results support the earlier findings in lead treated animals observed under various stimulating conditions and show that there is a low deposition of bone mass (9 -14). The loss was significant ($p<0.05$) in higher doses of NiCL2 (12.8 and 28.2 mg/kg) and non-significant ($p>0.05$) in small dose (5.8 mg/kg) of NiCL2 in the experimental animals.

Table 1: Variations in wet weight and dry weight of femur in control and experimental groups

Sample	Wet. Weight (Mg) .1	Dry Weight (Mg) .2	Wet. Weight Wet. Water (Mg) .3	Dry weight Wet. Water (Mg) .4	%. Weight (Mg) loss Between1& 2	% weight (Mg) loss Between3& 4
Control	**37.1±2.3**	**27.1 ± 1.7**	**34.0 ± 2.1**	**21.2 ± 1.2**	**32.5 ± 1.5**	**36.1± 2.3**
5.8 NiCl2	**35.9 ± 3.2**	**26.1 ± 1.6**	**33.2 ± 2.3**	**20.8 ± 1.4**	**30.4 ± 1.4**	**36.6 ± 1.4**
12.8 NiCll2	**33.0 ± 2.4**	**20.9 ± 1.2**	**30.9 ± 1.9**	**19.9 ± 1.3**	**33..5 ± 2.3**	**39.5± 2.2**
28.2 NiCl2	**28.9 ± 1.9**	**18.2 ± 1.1**	**27.8 ± 1.6**	**12.9 ± 0.9**	**38.9 ± 2.8**	**51.2±3.1**

References

[1]. Katz, J.L. (1980). The structure and biomechanics of bone in mechanical properties of biological materials. Cambridge University press, Cambridge. Pp. 137–168.

[2]. Lakes, R. (1993). Materials with structural hierarchy. Nature, 361: 511-515.

[3]. Pidaparti, R.M.V.; Chandram, A., Takano, Y., and Turner, C.H., (1996). Bone mineral lies mainly outside collagen fibrils: Predictions of a composite mode/ for osteonal bone. J. Biochem., 29: 909–916..

[4]. Glimcher, M.J. (1959) Molecular biology of mineralized tissues with particular reference to bone. Rev. Med. Phys. 42: 359–363.

[5]. Gony, J.K., Arnold, J.S., and Cohn, S.H.(1964). Composition of trabecular and cortical bone. Anat. Rec., 149: 325–333.

[6]. Schiffman, F., Corcoran, B.A., and Martin, G.R., (1966). Arch. Biochem. Biophys., 115:87..

[7]. .Mailman, R.B., (1980). Introduction to environmental Toxicology. Elsevier, New York. Pp. 43.

[8]. Lacher, T.F. Jr. and Goldstein, M. I., (1997). Tropical ecotoxicology status and needs. Environ. Toxicol. Chem. 16: 100.

[9]. Yamaguchi, M., Oishi, H., Suketa,Y. (1987). Stimulators effect of zinc on bone formation in tissue culture. Biochem. Pharmacol. 36: 4007–4012.

[10]. Povilles, J.M. (1989). What to expect from the measurement of bone mass. Rev. Rham. Mal. Osteoortic., 56: 479–485.

[11]. Deluca, H.F. (1977). Vitamin D endocrine system. "Advances in clinical chemistry." Academic press, London, 125–174.

[12]. Hock, J.M. (1986). Stimulation of undermineralized matrix formation by 2,5– dihydroxy vitamin D3 in long bone of rats. Calciff. Tissue Int., 38: 79–86.

[13]. Chettle, D.R. (1981). Lead in bone– sampling and quantitation using x–rays. Environ. Health Perspect., Feb. 91: 49–55.

[14]. Jornes, P.G., Vandeuyus, F.F., Nayts, G.D. (1991). Bone lead and renal failure. Nephron, No. 1–4: 494.

Khalid H. Gathwan "Inhibitory Effects of Nickel Chloride on Bone Composition.". "IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), Volume 17, Issue 2 (2018), PP 58-59.