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One Sample t-test

Independent t-test

Pearson

Pair sample t-test

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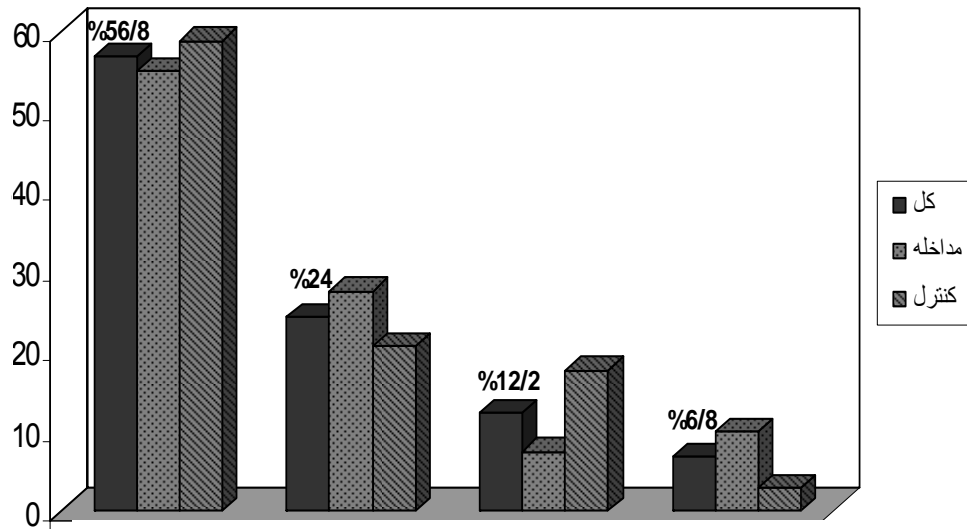
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REFERENCES

1. Zhou Jr, Canae MM. Bone zinc is poorly released in young rats fed marginally zinc-restricted diet. *J Nutr* 1995; 123: 1838-88.
2. Cashman K. Trace elements and bone metabolism. *Bibl Nutr Dieta* 1998; 54: 150-164.
3. Brandao J, Blois W. The essential role of zinc in growth. *Nutr Res* 1995; 15: 335-58.
4. Atik Os. Zinc and senile osteoporosis. *J Am Geriatr Soc* 1989; 31: 790-1.
5. Elmstahl S, Gullberg B, Janzon L, Johnell O, Elmstahl B. Increased incidence of fractures in middle-aged and elderly men with low intake of phosphorus and zinc. *Osteoporos Int* 1998; 8: 333-40.
6. Tucker KL. Dietary intake and bone status with aging. *Curr Pharm Des* 2003; 9(32): 2687-704.
8. Cummings SR, Rubin SM. The future of hip fracture in the United States; number, cost and potential effects of post menapausal estrogen. *Clin Orthopedics* 1990; 252: 163-6.
9. Wuehler S, Peerson J. Estimation of the global prevalence of zinc deficiency using national food balance data. *FASEB J* 2000; A510: 4.
10. Saskia J, Osendarp E, Blak E. The need for maternal zinc supplementation in developing countries. *J Nutr* 2003; 133: 817-27.
11. Freudenheim J, Smith E. Relationships between usual nutrient intake and bone mineral content of women 35-65 years of age. *Am J Clin Nutr* 1986; 44: 863-76.
12. Igarash A, Yamaguchi M. Stimulatory effect of zinc acexamate administration on fracture healing of the femoral-diaphyseal tissues in rats. *Gen Pharmacol* 1999; 32(4): 463-9.
13. Zhou J, Canar M, Erdman JW Jr. Bone zinc is poorly released in young growing rats fed marginally zinc restricted diet. *J Nutr* 1995; 123: 1383-8.
14. Barnes GL, Kostenuik PJ, Gerstenfeld LC. Growth factor regulation of fracture repair. *J Bone Miner Res* 1999; 14: 1805-15.
15. Yamaguchi M, Uchiyama S. Oral administration in combination with zinc enhances B-cryptoxantin-induced anabolic effects on bone components in the femoral tissues of rats in vivo. *Biol Pharm* 2006; 29: 371-4.

16. Gonzalez-Reimers E, Duran-castellon MC, Martin-Oliver R. Effect of zinc supplementation on ethanol-mediated bone alterations. *Food Chem Tox* 2005; 43: 1497-505.
17. Cen X, Wang R. Zinc promotes proliferation and differentiation and differentiation of osteoblast in rats in vitro. *Zhong Yu Fang Yi Xue Zhi* 1999; 33: 221-3.
18. Hosea HJ, Taylor CG, Wood T, Mollard R, Weiler HA. Zinc deficient rats have more limited bone recovery during repletion than diet restricted rats. *Exp Biol Med* 2004; 229: 303-11.
19. Zang YH, Cheng YY. Effects of zinc deficiency on bone mineralization and its mechanism in rats. *Zhaong Fang Yi Xue Zh* 2003; 37: 121-4.
20. Oner G, Bala R. Effect of zinc deficiency on serum somatomedin levels and skeletal growth in young rats. *Endocrinology* 1960; 144: 1860-3.
21. Hashizume M. Effect of B-alanyl-L-histidinato zinc on differentiation of osteoblastic MC3T3-E1 cell: increases in alkaline phosphatase activity and protein concentration. *Mol Cell Biochem* 1994; 131: 19-24.
22. Kishi S, Segawa Y. Inhibitory effect of zinc compounds on osteoclast-like cell formation in mouse marrow cultures. *Biochem Pharmac* 1995; 45: 1225-30.
23. Yamaguchi M, Ehara Y. Zinc decrease and bone metabolism in the femoral-metaphyseal tissues of rats with skeletal unloading. *Caicif Tissue Int* 1999; 57: 218-23.
24. Uchiyama S, Kaori I. Synergistic effect of B-cryptoxantin and zinc sulfate on the bone component in rat femoral tissues in vitro: the unique anabolic effect with zinc. *Biol Pharm Bul* 2005; 28: 2142-5.
25. Oishi H, Suketa Y. Stimulatory effect of zinc on bone formation in tissue culture. *Biochem Pharmacol* 1987; 36: 4007-12.
26. Matsui T. Zinc modulation of insulin-like growth factor effect in osteoblastic cell. *Peptides* 1998; 6: 1063-8.
27. Zhong M, Hiroyuki M. Stimulatory effect of Zinc on insulin-like growth factor-1 and transforming growth factor-B1 production with bone growth of newborn rats. *Int J Molecul Med* 2001; 8: 623-8.
28. Kitajima T, Yamaguchi M. Effect of estrogen on bone metabolism in tissue culture: Enhancement of the steroid effect by zinc. *Res Exp Med* 1995; 191: 145-54.