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Salivary calcium level during lactation

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ABSTRACT

Aims: To determine the salivary calcium during lactation in females and compare with non–lactating females. The saliva nowadays is considered as good source or media for estimation of several ions such as calcium, magnesium, copper, zinc and even abused drug. **Materials and Methods:** The unstimulated saliva was collected from sixty females, thirty lactating and the other thirty were non–lactating. **Results:** Salivary calcium ion concentration in non–lactating females was 5.021 $\pm$ 0.1 compared to 2.46 $\pm$ 0.21 in lactating mothers that reflect a significant decline in calcium concentration ($p < 0.001$). **Conclusion:** This decline in calcium concentration reflected the importance of external calcium supplement during lactation.

Key Words: Salivary calcium, lactation.

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INTRODUCTION

The human body contains more calcium than any of the other essential minerals as much as 1200 g in a 70 Kg adult. At least 99% of the total is in bones and teeth, 700 mg of calcium may enter and leave the bones each day.[1]

Salivary calcium related to plasma levels is about 3mEq/L under resting condition. Like plasma, the major fraction of salivary calcium is diffusable and ionic, while the rest is in a bound form, either with protein or as colloidal calcium phosphate. High level of salivary calcium is apparently responsible for the resistance to dental decay.[1] Calcium concentration in saliva is low; the normal concentration of calcium in unstimulated whole mixed saliva is 4–6 mg/dL.[2, 3]

In alkaline pH, calcium plays role in remineralization of enamel surface via formation of hydroxyapatite crystals, while in acidic pH salivary calcium play role in preventing dissolution of enamel.[4, 5] From this idea, salivary calcium play an important role in the prevention of tooth decay in particular. Deficiency of salivary calcium will consequently results in extensive dental decay and teeth loss that most females during lactation were complaining of.

The aim of this study was focused to estimation of salivary calcium during the period of lactation and compared it with non–lactating females.

MATERIALS AND METHODS

Total of 60 females were participated in this study. Females were divided into two groups:

Group I (Control Group): Thirty non–lactating females were selected randomly.

Group II (Experimental Group): Thirty lactating females were selected randomly.

Collection of Saliva Samples

Unstimulated saliva was collected from all females in plastic tubes over a period of not more than 7 minutes. Prior to collection of saliva, females were instructed to wash their mouths with unionized water to remove any food or debris in their mouths. Saliva was centrifuged at 4000 r.p.m. using bench centrifuge. The supernatant was then separated and stored at –20 ºC until time of analysis.[3, 6, 7]

Determination of Salivary Calcium

Salivary calcium was determined by colorimetric method without deproteinization.[7] Colour interference due to magnesi-

um ions is eliminated by 8–hydroxyquinoline up to 4 mmol/L (10 mg/dL).

The optical density (OD) was measured at a wavelength of 570 nm against the blank.

Calculation was done according to the following equation:

$$\frac{\text{OD of Sample}}{\text{OD of the Standard}} \times \text{Standard Concentration} = \text{Concentration of Calcium in mg/dL.}$$

Results were analyzed using Student's t–test and the degree of significance was recorded when $p \leq 0.05$.

RESULTS

Total of 60 females were participated in this study and divided into two groups: Group I, thirty non–lactating females with an average age of 26.13 ± 1.1 years; and Group II, thirty lactating mothers with an average age of 30.67 ± 1.3 years (Table and Figure 1).

The average salivary calcium in group I was 5.021 ± 0.1 mg/dL, while the average salivary calcium in group II was 2.46 ± 0.21 mg/dL with significant difference between them at $p < 0.001$ (Table and Figure 2).

Table: Distribution of females, age and salivary calcium concentration

	Group	No.	Age (Years)	Salivary Calcium Concentration (mg/dL)
				Mean ± SD
I	**Non–lactating**	30	26.13 ± 1.1	5.021 ± 0.1*
II	**Lactating**	30	30.67 ± 1.3	2.46 ± 0.21*

* $p < 0.001$.

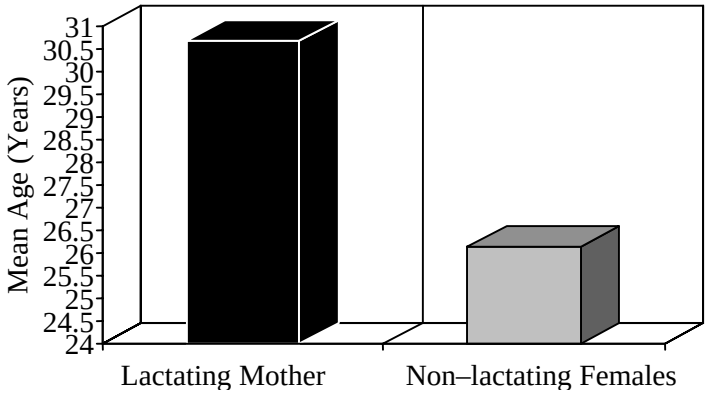

Figure (1): Distribution of age in the study groups

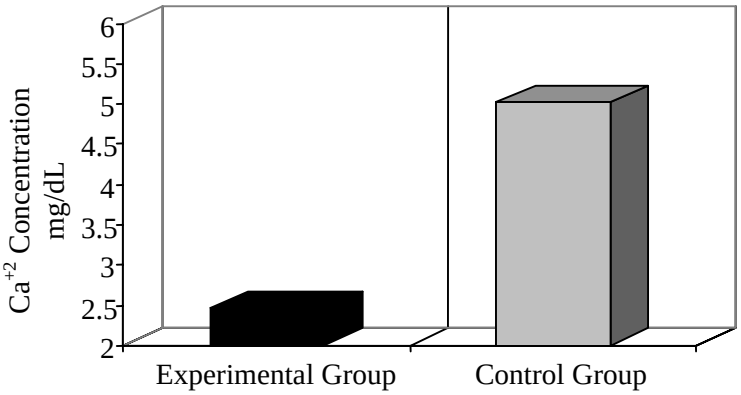

Figure (2): Salivary calcium concentration in the study groups

DISCUSSION

Lactation is the process of milk secretion from mammary glands. Breast–feeding is best route for infant feeding because it provides the ideal nutrient and immunologic properties body's need. Meeting calcium

need during lactation is important. Between 160–300 mg of calcium are lost through production of breast milk during period of lactation. Unlike pregnancy, calcium absorption does not increase during lactation. Only 32% of consumed calcium is absorbed during lactation whereas 37% is absorbed 3 months after weaning. Women who breast feed their infants for at least 6 months lose bone density at selected sites regardless of their calcium intake. When calcium intake is adequate and menses returns after weaning any bone loss that occur during lactation is regained.[8]

Studies have shown that the majority of women with pregnancy–associated osteoporoses are breast–feeding at the time of diagnosis. Bone loss tends to be greatest in skeletal sites. Two physiologic occurrences may be responsible for bone loss during lactation. First, there is an increased calcium demand from maternal bone. This demand varies from woman to woman, based on the amount of breast milk production and upon duration of lactation. Secondly, because of elevated prolactin level.[9] It is a lactogenic hormone and facilitates milk secretion in lactating women. It has also a luteotrophic action in lower animals. In this study, salivary calcium concentration in non–lactating mother was in accordance with other studies,[2, 3] and was within the normal salivary calcium level. In lactating mother, salivary calcium was significantly lower than normal ($p < 0.001$). This was in accordance with the results recorded in lactation there will be decrease in calcium level lead to osteoporosis.[8, 9] According to this finding lactating mothers must be instructed to increase their calcium intake by administration of enough amount of dairy products or in severe situations a supplementary use of external calcium and fluoride ions to overcome osteoporosis and teeth decay and tooth loss that was widely distributed complication of breast feeding in our sociality. Due to the fact that there is no enough dietary calcium intake to help replenish their daily loss and meet the body's physiologic requirements, the body's store house of calcium–bone–teeth is called upon to release calcium into the blood. Prolonged removal of calcium over the time, without adequate dietary replacement, will eventually leave bone weakened and more prone to breaking.[10]

CONCLUSION

Salivary calcium concentration during the period of lactation was estimated. The results in this study reflected a significant decline in salivary calcium concentration when compared to non–lactating females, which reflect the importance of external calcium supplement during the period of lactation.

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