



## EFFECT OF CIGARETTE SMOKING ON PLASMA LEVEL OF CALCIUM AND PHOSPHATE IN SUDANESE MALE SMOKER

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Article Received on 20/05/2017

Article Revised on 10/06/2017

Article Accepted on 30/06/2017

### ABSTRACT

**Background:** Cigarette smoking has a harmful effect on the body. Numerous toxic substances are found on tobacco smoke, leading to hormonal disturbance which is responsible for regulation of plasma calcium and phosphate. The aim of my study is to evaluate the effect of cigarette smoking on plasma level of calcium and phosphate. **Methodology:** This case control study was carried out in Khartoum state in period from (March 2017-April 2017), total of 100 Sudanese male were involved in this study (50 smokers and 50 nonsmokers as control group). Plasma calcium and phosphate were estimated using cobas 400 -integra. **Results:** The result revealed significant decrease (p value = .000) in plasma calcium in smokers group compared to control (8.3 ± 0.67) (8.8 ± .46)mg/dl respectively and significant increase (p value = .032) in plasma phosphate compared to control (3.5 ± 0.57) (3.2 ± 0.68) respectively, Calcium negatively correlated with number of cigarette (p value = .012, r = -0.352) and period of smoking (p value = .001, r = -0.446), while phosphate is positively correlated with number of cigarette per day (p value = .000, r = 0.581) and period of smoking (p value = .045, r = .284). **Conclusion:** the effect of cigarette smoking on plasma level of calcium and phosphate was proved, with significant decrease of plasma calcium and increase of plasma phosphate and significant positive correlated with period of smoking and number of cigarette per day in case of phosphate, significant negative correlated with both in case of calcium.

**KEYWORDS:** smoking, calcium, phosphate.

### 1. INTRODUCTION

Smoking harms nearly every organ in the body, causing many disease and reducing the health of smoker in general.<sup>[1]</sup> Exposure to smoke causes lung cancer, cardiovascular diseases and toxicity to the human reproductive system, all this is developed due to the level of exposure and the level of dosage.<sup>[2]</sup> Smoking have effect in skeleton and concentration of mineral, calcium is an important mineral mainly found in bone and teeth, the normal level of serum calcium is 8.9-10.1 mg/dl.

Like calcium, phosphorus is also an important mineral. Phosphate is the constituent of bone and teeth. The normal value of serum phosphate is (2.4-4.1 mg/dl).<sup>[3]</sup>

Serum calcium and phosphate regulation were achieved by hormonal action on the bone, kidney and intestine, the parathyroid hormone causes mobilization of calcium and phosphate from bone to plasma, while its action on the renal tubules is to enhance reabsorption of calcium and loss of phosphate, the overall action of PTH is to increase serum calcium and to reduce serum phosphate.<sup>[4]</sup> Vitamin D is well known as a hormone involved in mineral metabolism and bone growth, its most dramatic effect is to facilitate intestinal absorption of calcium,

although it also stimulate absorption of Phosphate.<sup>[5]</sup>

Calcitonin is a protein hormone, its main actions are to increase bone calcium content and decrease the blood calcium level when it rises above normal. It also lowers the blood phosphorus level when that rises above normal. Calcitonin opposes the effects of parathyroid hormone.<sup>[6]</sup>

A considerable number of chemicals have been found in cigarette smoke, one or more of these chemicals may interfere with action of the PTH, This could be by inhibiting; it's release from the parathyroid gland, its action on bone or its action on the renal tubules.<sup>[7]</sup> The aim of my study is to evaluate the effect of cigarette smoking on level of calcium and phosphate, and relation to smoking habits. There are many studies about the effect of cigarette smoking on calcium and phosphate; one descriptive cross sectional study show there are significantly lower calcium and significant increase in serum phosphate in smoker group compared to nonsmoker (p value < .05)<sup>[8]</sup>, another cross sectional study done in healthy adult female smoker show there are significant increase in serum calcium and phosphate in smoker group compared to nonsmoker.<sup>[9]</sup> Other cross sectional study done in 510 healthy post- menopausal

women Show there are no difference in serum ionized calcium and phosphate between smoker women and nonsmoker.<sup>[10]</sup>

## 2. MATERIALS AND METHODS

Hundred male were enrolled in this study, during the period of (March 2017 \_ April 2017). 50 of these male were cigarette smokers and 50 were not smokers used as control. The study area were in Khartoum state. The inclusion criteria was healthy smoker with period of smoking > 10 year, number of cigarette > 10 cigarette per day. Exclusion criteria, was no one have medical history of hypertension, diabetes, renal disease, liver disease, bone disorder, Parathyroid hormone disorder.

Blood sample were collected and analyzed by used Cobas 400-integra. SPSS version 16 was used for data analysis.

## 3. RESULTS

The result of calcium and phosphate in smoker within the age of (20 \_ 50 year) and control group within the age of (19\_55) are shown in table (1). Calcium level show significant decrease in smoker with mean (8.3±.67)mg/dl when compared to control group(8.8±.46)mg/dl, With (p value =.000 ), phosphate level show significant increase in smoker with mean (3.5±.57)mg/dl in smoker group when compared to control group (3.2±.68) mg/dl, with(p value =.032).Result of correlation studies shown in table (2) revealed there were significant negative correlation between calcium of smoker and number of cigarette per day( $r = -.352$ , p value=.012) and Duration of smoking( $r = -.466$ , p value=.001), While there were significant positive correlation between phosphate of smoker and number of cigarette per day( $r = .581$ , p value=.000) and duration of smoking( $r = .284$ , p value=.045).

**Table 1: show the comparison in means of calcium and phosphate between smokers and control group:**

		N	Mean ± SD	Sig.
Calcium	Case	50	8.3 ± .67	.000
	Control	50	8.8 ± .46	
Phosphorus	Case	50	3.5 ± .57	.032
	Control	50	3.2 ± .68	

**Table 2: show the correlation between calcium, phosphate, number of cigarette and duration.**

	Correlations	Significant
Calcium and number Of cigarette/day.	-.352	.012
Calcium and Period Of Smoking.	-.466	.001
Phosphate and number Of cigarette/day	.581	.000
Phosphate and Period Of Smoking	.284	.045

## 4. DISCUSSION

This study shows the effect of cigarette smoking on plasma level of calcium and phosphate, there were decrease in plasma calcium and increase in plasma phosphate in smokers group compared to control group. This may be due to interference of smoking with the action of parathyroid hormone in renal tubule, therefore lowering of serum calcium and increasing of serum phosphate. These result agree with study of Hussein, Salah Eldin Omar (2015).<sup>[8]</sup>

Other study showed there are no difference in calcium and phosphate between post menopausal women smoker group and control group, which differs with our result. Brot, C., Jorgensen, N. R., & Sorensen, O. H. (1999).<sup>[10]</sup>

Another study showed increase in calcium on smoker group compared to control. disagree with our study. Hopper, J. L., & Seeman, E. (1994).<sup>[3]</sup>

## 5. CONCLUSION

The result of study showed decrease of plasma calcium and increase of phosphate in smoker group compared to nonsmoker and there were negative correlation found between calcium, duration and number of cigarette per day. But phosphate show significant positive correlation with duration and number of cigarette per day. Educational program should be available to increase people awareness about health effects of smoking.

Further studies should be done to measure level of parathyroid hormone and vitamin D to confirm these result.

## 6. ACKNOWLEDGMENT

I would like to thank Khartoum hospital in which the analysis is done, and all people who supported me in this study.

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