

## Serum calcium, phosphorus and uric acid among daily consumer of sweetened, fizzy soft drinks

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### Abstract:

**Background:** *soft drinks had become very popular at the last decades, their health effect is unclear, however several studies pointed toward their effect on different serum parameters. our objectives was to evaluate the effect of sweetened, phosphorus containing soft drinks consumption on serum calcium uric acid and phosphorus, and to find the correlation between their effect and the frequency of consumption.*

**Methodology:** *a case control study was conducted among 75 apparently healthy Sudanese volunteers, categorized into three groups according to the frequency of consumption per week. The blood samples were analyzed for the calcium, phosphorus and uric acid levels. Analysis of data had been done with SPSS software program, version 16.*

**Results:** *Among 75 Sudanese individuals, sweetened, fizzy soft drinks consumption was associated with significantly lower serum calcium (p value 0.00) , increased serum phosphate(p value 0.00) and there was no significant increase in serum uric acid (p value 0.49).*

**Conclusion:** *Significant increase in serum phosphorus and, decrease in serum calcium and not significant increase in serum uric acid on daily fizzy soft drinks consumer.*

**Key words:** sweetened soft drinks, phosphorus containing soft drinks, serum calcium, serum uric acid, serum phosphorus

## INTRODUCTION

Consumption of soft drinks has increased all over the world for the last decades. Many studies suggest a relationship between soft drinks consumption and several health problems. The information that can be obtained from studies in this field will be very valuable and beneficial in many ways in medical field.

The correlation of sweetened soft drinks and serum uric acid had been a field for many researchers. The theory as follows: sweetened soft drinks contain a considerable amount of fructose. Fructose is the only carbohydrate that induces uric acid production by increasing the degradation of ATP to AMP, which is a precursor for uric acid. Phosphorylation of fructose in liver uses ATP and the related depletion of phosphate limits the production of ATP from ADP and so it serves as a substrate in the metabolic pathway for uric acid production (1,6,7,8,9). Hyperuricemia is the main precursor for gout, so if this hypothesis is correct we need to consider sweetened soft drinks consumption in dietary recommendation for gout.

It thought that high phosphate content in phosphoric acid containing soft drinks “fizzy drinks” increase phosphate level in serum due to increase absorption, and decrease calcium levels, this hypothesis is based on the fact that exogenous phosphate inhibits 1 $\alpha$ -hydroxylase and reduces vitamin D biosynthesis so decrease intestinal absorption of calcium and renal re-absorption(3,10,11).

The aim of this study is to find the correlation between sweetened, fizzy soft drink consumption and these biomarkers among some of Sudanese population.

## **MATERIALS AND METHODS**

The case control study population includes 75 apparently healthy Sudanese adults, regardless to gender, with different consumption frequency of sweetened, fizzy soft drinks (Cola and Pepsi).

The mean of participant age is 28 years old.

Mainly there are three groups of volunteers according to the amount they consume per week: control group, group A consume 1-1.5 litter/week and group B consume  $\geq 2.5$  litter/week.

To minimize the source of effect on this parameters the volunteers were asked about their health status, their diet, alcohol consumption, and if they are taking any medication.

Albumin was estimated to exclude any false hopocalcimea.

Serum calcium, phosphorus, uric acid and albumin were estimated calorimetrically using chemical reagents.

Data analysis had been processed using SPSS software program version 16.

## **RESULTS**

The result showed that serum calcium was significantly decreased in consumers when compared with control group (p value  $< 0.05$ )

There is also a significant difference in serum calcium level between group A and group B (p value  $< 0.05$ ).

Serum phosphorus also shows significantly increase in consumers when compared with control group (p value  $< 0.05$ ), and in group B when compared to group A (p value  $< 0.05$ ).

For serum uric acid there is an increase in the mean of consumers when compared to control but this difference is not significant (p value  $> 0.05$ ). Also there is an increase in the

mean of group B when compared with the mean of group A but it's not significant also (p value >0.05).

**Table 1: shows the Mean±SD of serum calcium, phosphorus and uric acid for control and consumers.**

parameter	Control N=25	Consumer N=50	P value
Calcium	9.23±0.45	8.9±0.37	0.00
Phosphorus	3.9±0.48	4.4±0.58	0.00
Uric acid	4.2±1.1	4.4±1.2	0.49

**Table 2: shows the Mean±SD of serum calcium, phosphorus and uric acid for group A and group B.**

Parameter	GroupA 1- 1.5L/week	GroupB ≥2.5L/week	P value
Calcium	9.0±0.31	8.8±.39	0.018
Phosphorus	4.2±0.4	4.6±0.6	0.01
Uric acid	4.1±0.9	4.7±1.3	1.634

## DISCUSSION

The result of this study doesn't show a significantly difference in serum uric acid level. Which is not agree with Jee Woong (1), and Adil alkheadaidei(3).this may be due the fact that those studies were done outside Sudan. Actually the sugar content of soft drink is not specified in the ingredient mentioned on the containers. And this study did not analyze the soft drinks content to find out whether the sugar used is fructose or other sugar.

Calcium level where decreased in this study which agree with Adil Alkhedaidei(3).

Katherine L Tucker and Kyoko Morita(4) study about bone mineral density and Cola carbonated drink pointed toward suggestion of caffeine as the responsible of calcium and bone changes regardless of phosphate. Some researchers Heaney

RP(5) for example suggest that milk replacement by soft drinks is the main cause of calcium abnormalities. Our study conducted regardless of caffeine content and without adjustment for milk intake. So this study can't validate their suggestion.

Increasing phosphate level as result in this study agree with Adil Alkhedaidei (3) study.

## **CONCLUSION**

Significant increase in serum phosphorus and, decrease in serum calcium and not significant increase in serum uric acid on daily fizzy soft drinks consumer.

As general this field needs a considerable attention and further studies is needed in order to understand the effect of sweetened, fizzy, soft drinks consumption on the population.

## **ACKNOWLEDGMENT**

Thanks for all participants in this study, clinical chemistry department, my supervisor Tarig Fadl-elmula, and everybody who helped.

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