

## Evaluation of Serum Copper and Chromium among Sudanese Patients with Gallstones

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### Abstract:

**Background:** *Cholecystitis and cholelithiasis are the most common disorders affecting the biliary system.*

**Objectives:** *The aim of this study was to evaluate the level of serum copper and chromium among Sudanese patients with gallstones patients.*

**Methods:** *Cross sectional study was conducted during the period from October to December 2015, fifty sample from known patients with gallstones and fifty samples from healthy person as control. The level of copper and chromium was measured using atomic absorption spectrophotometer 210-VGP methods. Data were collected*

*using structural questionnaire. Data analysis was carried out by means of statistical package for social science (SPSS version 16).*

**Results:** *The mean level of chromium showed significant decreased in gallstones patients when compared with healthy individuals (P.value = 0.016). There was significant increase of copper level in gallstone patients when compared with healthy individuals (P.value = 0.00). There was significant decreased of chromium level in male with p-value (0.001). There was insignificant variation in level of copper in gallstone patients between males and females.*

**Conclusion:** *Decrease chromium level and increase of copper level in gallstones patients.*

**Key words:** copper, chromium and gallstones

## **INTRODUCTION:**

The evaluation of trace elements like copper and chromium in human serum not only leads to discoveries of their role in human metabolism but also provides an important basis for the diagnosis of clinical disorders and intoxication.<sup>(8)</sup> Cholecystitis and cholelithiasis are the most common disorders affecting the biliary system. There are variations in incidence of gallstone according to geographical distribution. The incidence varies from country to country and even in different parts of the same country.<sup>(1)</sup> Gallstone disease represents a national health care problem, resulting in more than 600.000 cholecystomies per year.<sup>(2)</sup> despite decades of research, the mechanism of gallstone formation remains incompletely understood. The trace element are believed to play an important role in gallstone formation.<sup>(3,4)</sup> there are several types of gallstones; they are (calcium-bilirubinate and pure pigment stones), pure cholesterol, a mixture of bilirubin and cholesterol and inorganic stone<sup>(5)</sup>. chromium is essential for maintaining the structural stability of proteins and nucleic acid, also play an important role in glucose and lipid metabolism.<sup>(9,10)</sup> There is even evidence to suggest that

chromium promotes fat loss and lean muscle mass retention.<sup>(11,12,13)</sup> copper is an essential trace element for blood formation, most concentrated in the liver, heart, kidney, brain, bone and muscles and it is essential to blood.<sup>(14)</sup>

## **MATERIALS AND METHODS**

Cross-sectional study was conducted at Medical Military Hospital during the period from October to December 2015. Fifty Gallstones patients aged from 20-80 years, and fifty healthy individuals as control were enrolled in the study. Both groups were gender and age matched. Permission of this study was obtained from local authorities in the area of the study. An informed consent was obtained from each participant in the study after explaining objectives of the study. Interview and questionnaire was used to collect data. 5 ml of venous blood was collected from each participant. Serum was separated directly from the plain container by centrifugation at (300 rpm) for 5 minutes. Serum levels of chromium and copper was measured using atomic absorption spectrophotometer 210-VGP methods. Statistical analysis was performed using statistical package for windows (SPSS v16). Fisher's exact test was used to assess the categorical variables and student *t*-test or kruskal Walis for continuous variables. Data are presented as mean  $\pm$  standard deviation (SD). *P* value less than 0.05 was considered statistically significant.

## **RESULTS:**

Fifty sample from known patients with gallstones and fifty samples from healthy person as control were enrolled in the study.

As shown in (Table 1), the mean level of chromium showed significant decreased in gallstones patients when

compared with healthy individuals (P.value = 0.016). There was significant increase of copper level in gallstone patients when compared with healthy individuals (P.value = 0.00).

**Table (1) comparison of the level of Chromium and Copper between patients and control.**

Measured units	Means ± SD		p- value
	Patients No. =( 50)	Control No. =(50)	
<b>Chromium</b>	0.3052±0.27	0.98±0.18	0.016
<b>Copper</b>	1.34±0.46	1.08±0.18	0.000

There was significant decreased of chromium level in male with p-value (0.001).There was insignificant variation in level of copper in gallstone patients between males and females as shown in (table 2)

**Table (2) Comparison the levels of Chromium and Copper in Gallstone patients according to gender**

Measured units	Male No. =( 21)	Female No. =(29)	p- value
<b>Chromium</b>	0.24±0.19	0.34±0.31	0.001
<b>Copper</b>	1.38±0.39	1.30±0. 51	0.077

There was no effect of age on the level of chromium and copper in gallstones patients as shown in (table 3)

**Table (3) Comparison the levels of Chromium and Copper in Gallstone patients according to age.**

Measured units	Means ± SD		p- value
	Age less than 40 years No. =( 19)	Age more than 40 years No. =(31)	
<b>Chromium</b>	0.26±0.26	0.32±0.27	0.500
<b>Copper</b>	1.36±0.4	1.35±0. 45	0.786

Level of chromium was significantly affected by BMI however copper level not affected, as shown in (table 4)

**Table (4) Comparison the levels of Chromium and Copper in Gallstone patients according to BMI.**

Measured units	Normal BMI No. =( 31)	Obese No. =(19)	p- value
Chromium	0.27±0.25	0.32±0.27	0.016

## DISCUSSION

In this study fifty gallstones patients and fifty age and gender matched healthy individual as control were enrolled in the study .serum chromium and copper were measured. The level of chromium showed significant decreased in gallstones patients when compared with healthy individuals (P.value = 0.016). There was significant increase of copper level in gallstone patients when compared with healthy individuals (P.value = 0.00). this finding was in agreement with study done by Basu, S., et al., and Gupta et al who reported that there was strong relationship between the concentration of these metals and gallstones (18), (19). The study showed that there was insignificant variation in level of copper in gallstone patients between males and females, however there was significant decreased of chromium level in male with p-value (0.001)

Level of chromium was significantly affected by BMI however copper level not affected,(20).No association between the level of chromium and copper this finding was not in agreement with study done by Scobey, et al. due to different population and sample size(21).

## **CONCLUSIONS**

The present study concludes, decrease the level of chromium in gallstones patients, increase the level of copper in gallstones patients, also chromium level was decreased in male while increased in female gallstone patients when compared according to sex, insignificant variation in level of chromium and copper in gallstone patient when compared according to age group. Chromium level was decreased in obese gallstone patients when compared according to body mass index (BMI).

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